THE MARINE REVIEW

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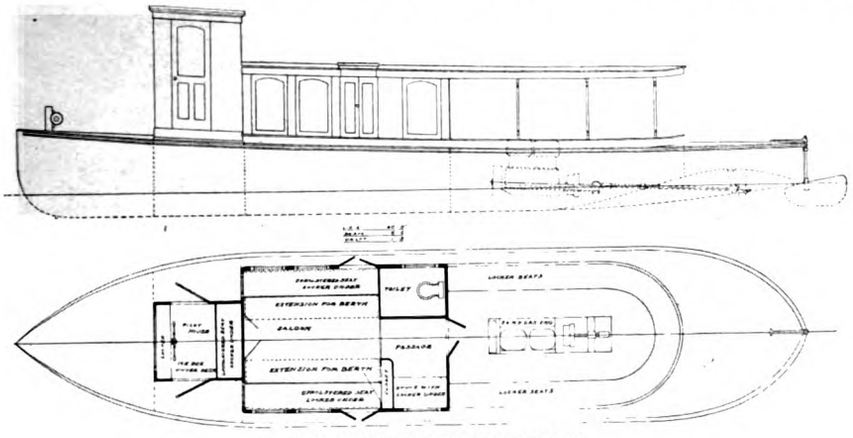
TUNNEL STERN LAUNCHES.

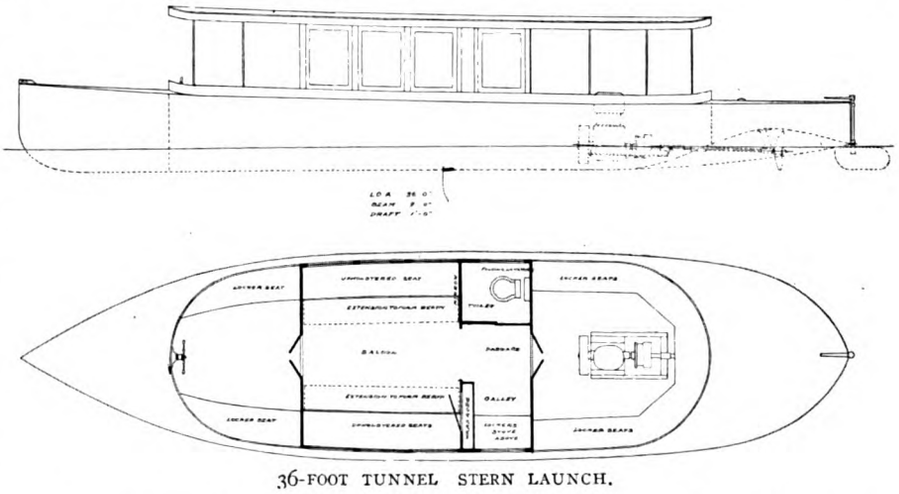
The accompanying drawing of a 36-ft. steel, one-half cabin river cruiser and a 40-ft. steel cruising launch, illustrate but two of the many types of turbine river boats constructed by the Racine Boat Manufacturing Co., Muskegon, Mich. The launch with a turbine propeller has a special form of stern to enable the propeller, which is but partly immersed, to work more efficiently. Air cannot be allowed to find its way into the low-pressure region forward of the propeller. To avoid this the Racine Boat Manufacturing Co. gives the launches a tunnel-shaped stern, so that the water around the wheel is completely covered by the hull. The propeller is so raised in this hollowed-out stern that when quiet it is only half in the water. When the wheel is put in motion the air is driven from this compartment and a vacuum created. While in this condition the water is forced in a solid body into the upper half of the tunnel, completly covering the propeller. In this way the wheel does its work perfectly. Ordinarily these launches are constructed from 16 to 36 ft. length, although any size can be built to special order. The small sizes are extremely handy for hunting and fishing purposes, as the draught is only from 8 to 10 in. The Racine Boat Manufacturing Co. recently built one of these 40-ft. cabin launches for service on the Gila river in Arizona.



40-FOOT TUNNEL STERN LAUNCH.

BATTLESHIP MINNESOTA'S TRIAL.

Newport News, Va., Nov. 5.—The new battleship Minnesota has returned to the yard of the Newport News Ship Building & Dry Dock Co. from the Rockland (Me.) trial course after one of the most remarkable demonstrations of speed that has been recorded for any battleship in the United States navy. On Wednesday the ship had its standardization trial. On Thursday followed the four hours' speed trial under forced draft. On the run down the coast the ship was given a twenty-four hours' endurance trial. In each the Minnesota demonstrated that it is not only able to exceed all of its contract requirements at any time and under any conditions, but it plainly showed that it has not an equal in the American navy for the ease with which it may be handled. The trials were successful beyond the expectations of builders and naval officers constituting the naval board of inspection and survey, as well as the members of the naval engineering board, which returned to Newport News on the vessel. The vessel averaged 18.87 knots an hour on her standardization trial, the best mile being steamed at the rate of 19.412 knots, which was reduced to 19.06 knots by tidal corrections. The number of revolutions a minute for the fastest five runs was 123.11, the maximum being 125.21. The number of revolutions necessary to attain the contract speed of 18 knots is 114.5. On the following day



36-FOOT TUNNEL STERN LAUNCH.

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the Minnesota had a successful four-hour speed trial off the New England coast, maintaining an average speed of 18.851 knots an hour. This trial was made under adverse conditions, the battleship plunging into a very heavy sea all of the way from Monhegan island to the finish off Cape Ann. The engines worked smoothly, developing 23,000 horsepower and the propellers maintained an average of 122.93 revolutions a minute. On the 24-hour endurance run down the coast, the ship averaged 18 knots an hour, developing 14,000 horsepower. This performance was remarkable, to say the least. It is to be expected that a ship will exceed its contract speed on an official trial, but for it to maintain its contract speed on a twenty-four hour run down the coast is regarded as nothing short of surprising.

LAUNCHING ARMORED CRUISER NORTH CAROLINA.

The armored cruiser North Carolina was recently launched at the yard of the Newport News Ship Building & Dry Dock Co. This cruiser is 502 ft. on the load water line, 72 ft. 10½ in. beam and 25 ft. draught. Her main battery consists of four 10-in. breech-loading rifles, sixteen 6-in. breech-loading rifles, twenty-two 3-in. rapid-fire guns and eight 4-in. submerged torpedo tubes.

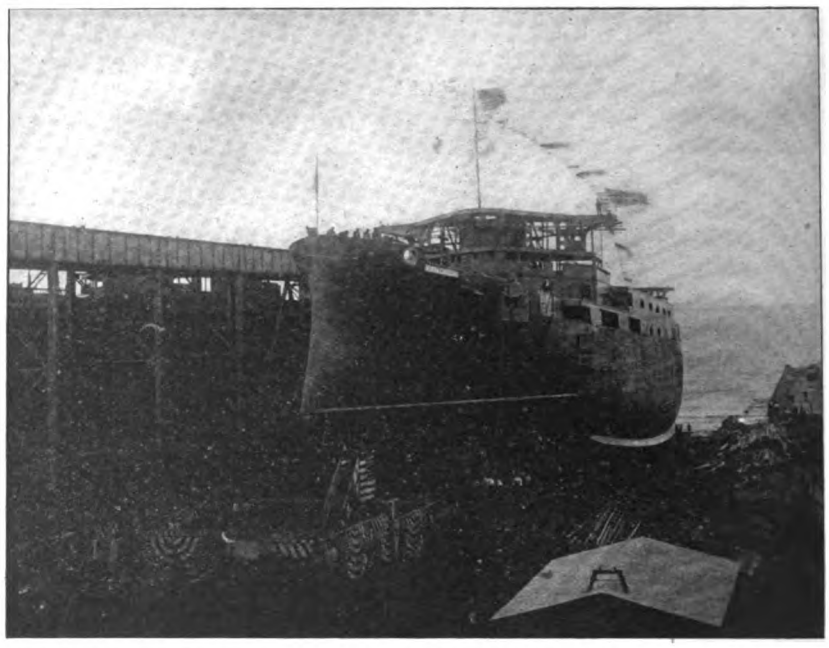
The propelling engines of the armored cruiser will be right and left, placed in watertight compartments and separated by a middle line bulkhead. The engines will be of the vertical, inverted-cylinder, direct-acting, triple-expansion type, each with a high-pressure cylinder 38½ in., an intermediate-pressure cylinder 63½ in., and two low-pressure cylinders 74 in. in diameter, the stroke of all pistons being 48 in. The indicated horsepower of propelling engines will be 23,000 when making about 120 revolutions per minute, and with a steam pressure of 250 lbs. at the high-pressure cylinder.

The order of the cylinders, beginning forward, will be forward low-pressure, high-pressure, intermediate-pressure, and after low-pressure. The forward low-pressure and high-pressure cranks will be opposite, also the intermediate and after low-pressure cranks, the second pair being at right angles with the first. The sequence of cranks will then be: High-pressure, intermediate-pressure, forward low-pressure, and after low-pressure.

The main valves will be worked by Stephenson link motions with double bar links. There will be one piston valve to the high-pressure cylinder and two each for the intermediate and low-pressure cylinders. The framing of the engines will consist of forged steel columns trussed by forged steel stays. The engine bed-plates will be of cast steel, supported on keelson plates. All cranks, line, and propeller shafting will be hollow. The shafts, piston rods, connecting rods, and working parts generally will be of forged steel.

Each main condenser (two in number) will have a cooling surface of about 14,400 sq. ft., measured on the outside of the tubes, with water passing through the tubes. The main circulating pumps will be of the centrifugal type, one for each condenser. The air pumps will be independent, of the vertical, double-acting type.

There will be sixteen boilers of the water-tube type, placed in eight watertight compartments. The total grate surface will be about 1,590 sq. ft., and the heating surface at least 68,000 sq. ft. The forced draft system will consist of blowers discharging into air-tight fire rooms, there being two blowers in each boiler compartment. There will be four smoke pipes.



LAUNCHING THE NORTH CAROLINA AT THE YARD OF THE NEWPORT NEWS CO., NEWPORT NEWS, VA.

NEW BATTLESHIPS.

It is reported at Washington that at the next session congress will be asked by the navy department for funds to build mighty fighting ships to rival the new British battleships. Secretary Bonaparte has directed the board of construction to investigate, not only the now famous Dreadnought, but more particularly the Inflexible, the Indomitable, and the Invincible, which were thought to be armored cruisers, but prove to be battleships of a new and formidable type.

To meet such a ship as the Dreadnought the bureau of construction has been engaged for a year in planning a monster battleship. Much progress has been made, and the department expected to have complete designs ready to back up a request to congress for the necessary money. Great Britain's newest coup will probably result in the abandonment of the plans adopted by the department. In her three new ships Great Britain has vessels which will have less displacement than the Dreadnought, but which will have greater speed and as great a battery. The American plans contemplated a battleship of 20,000 tons displacement, with a broadside to excel that of the Dreadnought. The new problem to be solved is to obtain a ship of less displacement than this, capable of greater speed, without sacrifice of fighting strength. This is the task Secretary Bonaparte has placed upon the board of construction.

In the event of success the next congress will probably be asked for funds for the construction of at least two, and possibly three, of the new class of ships evolved by England from lessons of the Russo-Japanese war. It had been planned to have the government build the single monster. The new developments will mean that private concerns will be asked to bid on all of whatever number of ships may be authorized except one to be government built. This phase makes the action of Secretary Bonaparte especially interesting in Philadelphia, Newport News, and a few other great war-ship-building centers.

The plans of the department will be fully revealed in the recommendations to be submitted to congress this winter. The secretary's attitude, however, is eloquently indicated in his instructions to the board of construction, and it is expected in naval circles here that Great

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Britain's new fighting wonders will be equaled, if not excelled, by the resulting product of the department's skilled designers.

SUMMARY OF NAVAL CONSTRUCTION.

The summary of naval construction, published by the bureau of construction and repair of the navy department, shows the customary rate of progress upon naval vessels since the last report:

Name of Vessel.	Building at	1906: Per cent of completion. Sept. 1.	Oct. 1.
	BATTLESHIPS.		
Nebraska	Moran Bros. Co.	96.38	96.71
Georgia	Bath Iron Works	99.6	100.
Connecticut	Navy Yard, New York	99.08	99.70
Vermont	Fore River S. B. Co.	92.7	93.6
Kansas	New York S. B. Co.	87.	91.
Minnesota	Newport News S. B. Co.	95.	96.
Mississippi	Wm. Cramp & Sons	62.18	65.52
Idaho	Wm. Cramp & Sons	60.29	62.41
New Hampshire	New York S. B. Co.	51.8	53.3
South Carolina	Wm. Cramp & Sons	0.	0.
Michigan	New York S. B. Co.	0.	.28
	ARMORED CRUISERS.		
California	Union Iron Works	95.	95.7
South Dakota	Union Iron Works	93.	93.2
North Dakota	Newport News S. B. Co.	57.18	61.09
Montana	Newport News S. B. Co.	51.03	54.28
	PROTECTED CRUISERS.		
Milwaukee	Union Iron Works	98.5	98.9
	TRAINING SHIPS.		
Cumberland	Navy Yard, Boston	98.29	99.9
Intrepid	Navy Yard, Mare Island	98.	99.6
	SCOUT CRUISERS.		
Chester	Bath Iron Works	44.97	47.40
Birmingham	Fore River S. B. Co.	44.9	47.4
Salem	Fore River S. B. Co.	45.	47.5
	SUBMARINE TORPEDO BOATS.		
Submarine T. B. No. 9	Fore River S. B. Co.	84.9	89.
Submarine T. B. No. 10	Fore River S. B. Co.	73.	73.
Submarine T. B. No. 11	Fore River S. B. Co.	85.9	90.
Submarine T. B. No. 12	Fore River S. B. Co.	69.9	74.4

RICHELIEU & ONTARIO NAVIGATION CO.'S NEW STEAMER.

The new steamer which the Richelieu & Ontario Navigation Co. is having built at Toronto for the run between Prescott, Ont., and Montreal, going through the St. Lawrence river rapids, will be 240 ft. long over all, with a breadth of 41 ft., the extreme width over wales being 43½ ft. The draught when loaded is not to exceed 6 ft. The bottom of the hull to the half turn of bilge is to be sheeted with British Columbia fir or rock elm. Her design is of the day boat excursion type, but provision will be made for about 94 staterooms at least, about four of which will be parlor rooms, and have bathrooms. The hold will contain quarters for deck hands, firemen and the entire crew with the exception of captain, mates, chief engineer, steward and cabin maids. The kitchen and messroom also to be in the hold. There will also be in the hold coal bunkers, boiler room, engine room and a gentlemen's cafe. Coal bunkers to be arranged for filling from the outside. The main deck will have windlass room and toilet rooms for crew, pantry, dining room, entrance hall for passengers, baggage space, enclosure around smokestacks and engine room uptakes. On the promenade deck there will be a large observation space forward for passengers. Next after this will be a cabin for sheltering passengers in stormy weather. The space aft of this cabin, to the stern of the boat, will be devoted almost entirely to stateroom accommodation for passengers, with merely a small cabin at the after end of this deck just forward of a small open passenger space at the extreme stern. The next, or hurricane deck, will be left entirely open, that is with no obstruction whatever, except for a small cabin with staterooms, and will be used as an observation deck for passengers when running the rapids. This deck to be covered with a light awning roof, and the deck to be extended to the stern of the boat. The pilot house and texas will be on this deck, the pilot house to be sufficiently raised for handling the boat with passengers in front of the pilot house. The captain's bridge may be provided in the awning roof which will not extend much forward of the pilot house. Boats are to be carried on this deck. The engines will be of the triple expansion, twin-screw type, each engine to have four cylinders working on four cranks; to be jet-condensing with independent air pumps. Boilers to be of the Scotch or cylindrical return tubular type to pass Canadian government inspection for 180 lbs. working pressure of steam; to be fitted for economy with a hot draft system.

The size of the engines and boilers to be sufficient for the guaranteed performance of the steamer as specified, namely, 18 miles per hour. The auxiliary machinery will include general donkey and fire pump, steam windlass, stockless anchors, etc. Hot draft fan with direct connected engine, fresh water pump and sanitary pumps, ash ejector; a combined steam and hand steering gear of the most efficient type, and suitable for the quick handling of boat necessary in the rapids. The steamer will be lighted by electricity, the plant consisting of two direct-connected multi-polar generating sets of sufficient capacity.—*Railway and Marine World.*

SHIP BUILDING IN BRITAIN.

From the returns compiled by Lloyds *Register of Shipping*, it appears that, excluding warships, there were 512 vessels of 1,264,767 tons gross under construction in the united kingdom at the close of the quarter ended Sept. 30, 1906. The particulars of the vessels in question are as follows, similar details being given for the corresponding period in 1905 for the purpose of comparison:

Description.	Sept. 30, 1906. No.	Gross Tonnage.	Sept. 30, 1905. No.	Gross Tonnage.
STEAM.				
Steel	477	1,253,031	444	1,319,718
Iron	1	500	1	320
Wood and Com.	...	.....	1	60
Total	478	1,253,531	446	1,320,098
SAIL.				
Steel	20	9,836	16	3,871
Iron	...	.....	...	.....
Wood and Com.	14	1,400	12	1,359
Total	34	11,236	28	5,230
Total steam and sail	512	1,264,767	474	1,325,328

The tonnage under construction which had shown a steady increase since December, 1903, and had reached at the end of last June to within about 4,000 tons of the highest figure on record (September, 1901), is at the present time over 144,000 tons less than that for the previous quarter. No such striking decrease within one quarter has taken place in the ship building industry of the country for the past 22 years, it being necessary to go back to June, 1884, to find so rapid a diminution of the work in hand. As will be seen upon reference to the diagram herein, a decrease of

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no less than 170,000 tons was then recorded.

Of the vessels under construction in the united kingdom at the end of September, 414 of 925,284 tons are under the supervision of the surveyors of Lloyds Register with a view to classification by this society. In addition, 59 vessels of 175,809 tons are building abroad with a view to classification. The total building at the present time under the supervision of Lloyds Register is, thus, 473 vessels of 1,101,093 tons. Details of this total follow:

Of these vessels three are of over 20,000 tons, two between 15,000 and 20,000 tons, four between 10,000 and 12,000 tons, seven between 8,000 and 10,000 tons, eighteen between 6,000 and 8,000 tons, 101 between 4,000 and 6,000 tons, ninety-five between 2,000 and 4,000 tons and forty-four between 1,000 and 2,000 tons.

CANADIAN GRAIN SHIPMENT.

Frank E. Gibbs, Dominion grain inspector, has prepared the following statement of shipment by vessel from Fort William and Port Arthur for the crop year 1905 (Sept. 1, 1905 to Aug. 31, 1906).

Destination	Wheat.	Oats.	Barley.	Flax.
Owen Sound	2,782,500	1,188,244	87,324	
Midland	3,900,527	.....	.....	.....
Depot Harbor	8,456,642	612,984	.....	.....
Collingwood	509,140	.....	.....	.....
Point Edward	2,327,864	10,000	64,432	146,408
Meaford	688,852	.....	.....	.....
Goderich	1,491,207	.....	.....	.....
Port Colborne	135,213	.....	.....	.....
Thorold	447,063	.....	.....	.....
Kingston	876,583	.....	125,515	.....
Montreal	9,321,013	1,892,006	293,775	78,757
Prescott	59,657	.....	.....	.....
Port Huron (Canada)	1,518,370	.....	.....	.....
Port Huron (U. S.)	619,606	.....	.....	97,130
Buffalo (Canada)	958,939	.....	.....	.....
Buffalo (U. S.)	14,379,510	195,851	.....	18,829
Erie (Canada)	212,183	.....	.....	.....
Erie (U. S.)	742,393	.....	.....	.....
Totals	49,627,267	3,899,086	571,047	341,127

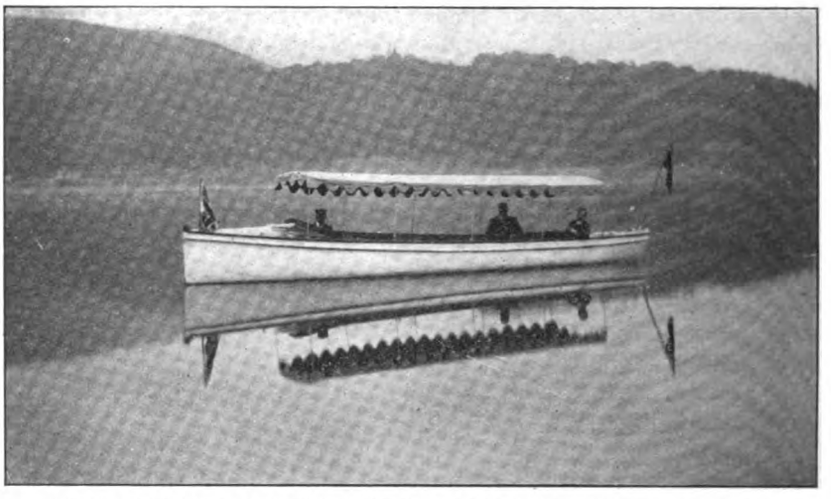
RECAPITULATION STATEMENT.

Total amount of grain shipped from Fort William and Port Arthur during the crop year of 1905 (Sept. 1, 1905, to Aug. 31, 1906):

	Wheat.	Oats.	Barley.	Flax.
Fort William	42,587,536	4,766,759	528,870	157,390
Port Arthur	12,922,184	954,056	430,676	299,538
Totals	55,509,720	5,720,815	959,546	456,928

ELECTRIC LAUNCH FOR TRADE PURPOSES.

The Liverpool Corporation has just had built for them an electric launch for use on Lake Vyenwy, from which the city derives its water supply. This launch has been specially designed for the purpose of towing barges laden with stone and other materials, as well as for ordinary use of inspection and transportation of workmen. It has an overall length of 31 ft., an extreme beam of 6 ft. 8 in., with a draught of 2 ft. 3 in. The hull, which has a plumb stem and pear-shaped stern, is carvel built of Kauri pine, with frames and main timbers of English oak. The fittings are of teak and brass throughout. A long turtle-back deck forward enables the boat to be used in heavy weather, while the deep combing which is carried round the well affords protection from water and spray. Seating accommodation is provided for 25 persons. The motor, which is fitted amidships, and supplied by the Motor Engineering Corporation, of Liverpool, is of the bipolar under type, specially designed for marine work, and is capable of developing 6 B. H. P. at a pressure of 150 volts. The motive power is derived from 88 accumulators of the Faure-King type. These cells are carried in acid-proof lockers underneath the seats, and the total mileage capacity is about 45 miles. The current is obtained from the electric plant on the lake side which is generated by the waste water running from the lake. The launch developed a mean speed on trial of 7¾ miles an hour, or ¾ of a mile over the contract speed. She has been designed and supplied by Messrs. Frederick H. Smith & Co., naval architects of Liverpool.



ELECTRIC LAUNCH FOR TRADE PURPOSES ON LAKE VYENWY, BUILT FOR LIVERPOOL CITY CORPORATION.

MORE BRITISH TURBINE STEAMERS ORDERED.

The turbine seems to have given satisfaction to the South Eastern & Chatham railways, for the cross-channel service of the company is to be augmented by two new turbine steamers, for which orders have just been given to Messrs. Denny Bros., of Dumbarton, who built the Queen, Onward and Invicta. Experience has proved in the running of the 22-knot turbine steamers that the coal consumption is about one-third less, per unit of power, than in the case of the 18-knot paddle boats. There is also a saving in engine room staff by nearly half—represented in figures by 42 per cent, and a further saving of about one-third in lubricating oils. The total advantage in favor of the turbine over the paddle steamer on all counts is very considerable, and the decision of the railway company to possess more turbine-driven boats is not to be wondered at. The principal dimensions of the new steamers will be—length 324 ft. and beam 42 ft. They will have a gross tonnage of 1,670, a speed of 22½ knots, and will develop 9,000 H. P.

PARSONS MARINE TURBINE REPORT.

Parsons Marine Turbine Co. report for the year ended June 30 states that the profit amounted to £25,994. The directors recommend a final dividend at the rate of 15 per cent per annum, making, with the interim dividend, 10 per cent for the year. The indicated horsepower of the turbine engines constructed during the year was 36,500, while the orders received amounted to 45,200 I. H. P.; in addition, turbines amounting to 92,780 H. P. were constructed by other companies under license.

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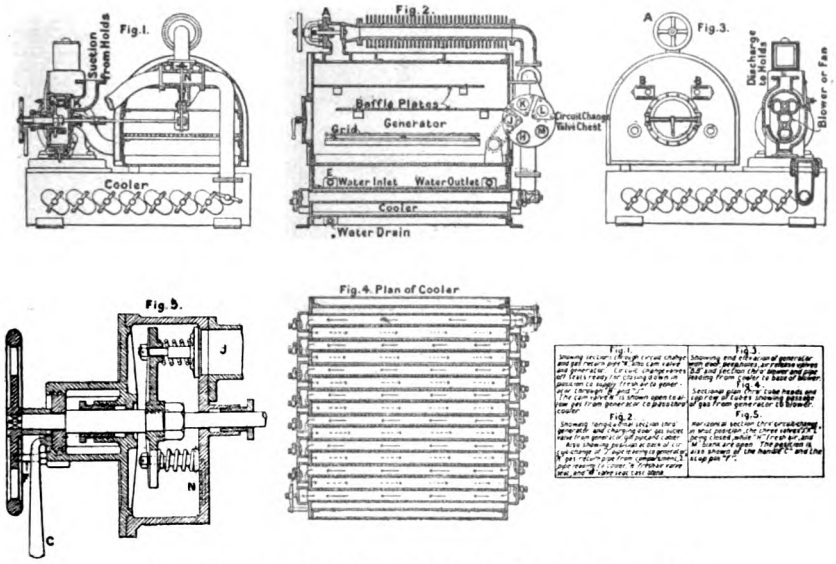
FIRE-EXTINGUISHING APPARATUS ON BOARD SHIP.

The steamship Aydon, a vessel recently constructed by Swan, Hunter and W. Richardson, Ltd., of Newcastle, and owned by Messrs. Adam Brothers, had a trial at sea a month or two ago in order to test the propelling machinery, which has been made by the Wallsend Slipway & Engineering Co., and also the fire-extinguishing installation which has been fitted on board this vessel by the Clayton Fire-Extinguishing & Ventilating Co.



CLAYTON FIRE-EXTINGUISHING APPARATUS FOR SHIPS.

The installation has been arranged to cope with and extinguish an outbreak of fire with sulphur dioxide gas, SO_2, in place of water or steam. This gas as is well known, will not support combustion, and will rapidly extinguish flame and put out fire. The apparatus appears simple, substantial, and one that is easily understood and worked.

It consists of a generator for making the sulphur dioxide gas, a water cooler for cooling the gas when first produced and reducing the temperature of an atmosphere in a hold or compartment where a fire has taken place, and a small engine and blower or fan for forcing the gas into the hold, circulating the atmosphere in the hold through the cooler and generator, and for ventilating purposes. An important feature in this plan of dealing with large and serious fires on board ship is the cooling or reduction of temperature effected by the machine of the air or atmosphere in the vicinity of the outbreak after the fire has been subdued or got under. This cooling or reduction of temperature has been found by experience greatly to reduce the possibility of the fire again breaking out, on the re-admission of air by the removal of the hatches or the opening up of the compartment in which a fire has occurred.

In this vessel the gas machine is fixed on the bridge deck just abaft amidships, and is connected on the port side by a suction and on the starboard side by a delivery main. Each main is 2½ in. in diameter, and consists of wrought iron pipes, which are led under the deck and supported from the beams by wrought iron clips. Auxiliary branch pipes of a smaller diameter, and having suitable valves worked from the decks, are led to the holds and bunkers; connections are also made at different parts of the main for flexible hoses to be connected so that the poop, forecastle, or cabins may be flooded with gas should a fire occur.

During recent years the great loss and delay occasioned by fire on ships has forced ship owners and underwriters to give the subject more serious attention, as there has been a steady opinion growing that steam and water alone are not effective or efficient agents to deal with this danger on ships at sea, as in numerous cases where a fire has broken out, which has with difficulty been subdued by water and steam, much damage has been done to valuable and costly cargoes which have not even been touched by the fire itself.

As sulphur dioxide gas—SO_2—can be cheaply and quickly made on board ship, and has been found by experience rapidly to put out an outbreak of fire without causing any damage to most cargoes, it has largely been employed as a precaution against fire; during the last few years between one and two hundred vessels have been fitted with an installation of the Clayton apparatus; many land installations have also been furnished with the machine, not only for fire-extinguishing, but also for fumigating and disinfecting purposes.

Figs. 1 to 5 are illustrations of the machine fitted on board the steamship Aydon. Figs. 1 and 3 are end views. Fig. 2 is a sectional elevation through the generator and cooler. Fig. 4 is a plan of the cooler. Fig. 5 is a section through the circuit change valve chest for connecting the generator on the suction side with the various holds and bunkers.

The description of the starting and working of the machine is as follows:

(1) The water, by means of one of the ordinary donkey pumps, is started circulating around the tubes in the cooler.

(2) The engine working the blower or fan is set running at about 400 revolutions per minute.

(3) The small valves on the branch suction and delivery mains connecting any desired compartment of the ship with the machine are opened.

(4) The roll sulphur, which is kept ready on a tray in the generator, is ignited or set on fire.

(5) The suction main and the generator are connected by means of the circuit change valves, and the main valve A—Fig. 2—on the top of the generator is opened. The circuit change valves are worked by the wheel D—Fig. 5—and the valve N on the end of the generator is also opened or shut automatically by the turning of this wheel.

When the machine has thus been started, the air in the compartment or hold to be treated is then drawn by the action of the fan or blower respectively through the suction main, circuit change valves K and I—Fig. 2—generator, valves A and N, and cooler, into the blower or fan. During the passage of the air through the burning sulphur in the generator, the oxygen, uniting with the sulphur, forms sulphur dioxide gas —SO_2—which, after being reduced in temperature by the cooler, is, on its arrival at the fan or blower, forced through the delivery main into the hold or compartment, where, if a fire exists, the gas will at once commence to smother it.

This action is kept on until the air in the hold contains about 3 per cent of gas, when a little fresh air is admitted to the generator by the valve H—Fig. 2—which is opened by a small wheel; when the air in the hold contains from 8 per cent to 10 per cent of gas, the connection between it and the generator is cut off by shutting the valve A, and the valve I in the circuit change—Fig. 2. The gas-laden atmosphere is now kept continually in circulation through the cooler and hold until the temperature of the latter has been reduced below 100 degrees Fahr., when the introduction of fresh air is gradually increased, and continued until the hatches and compartments can be safely opened out and ventilated.

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It is stated that in vessels fitted with similar apparatus, when an outbreak of fire has taken place, it has quickly been suppressed or brought under control by the gas; much delay has in some cases been saved by the relaxation of quarantine regulations owing to the effectual manner in which the vessel could be disinfected by the gas; a reduction or rebate on the insurance rate is granted to vessels fitted with this apparatus, and rats or any kind of vermin are easily exterminated by charging the atmosphere in the holds with 3 per cent of the gas.

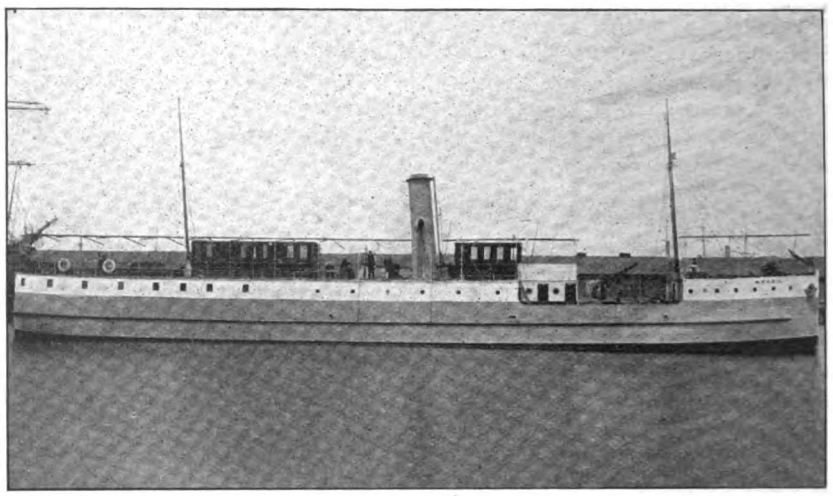
The trials and tests, which were witnessed by a number of gentlemen connected with shipping and shipping interests, were commenced before the vessel left Newcastle and afterwards continued at sea, consisted of charging the forehold with gas, putting out fire, extinguishing flame, and the general testing of the apparatus.

The trial in all respects was of a very satisfactory character, and on its conclusion the vessel left for its voyage.

NEW TYPE OF SHALLOW DRAUGHT STEAMER.

Messrs. Edwards & Co., of Millwall, London, favor us with the accompanying illustration of the steamship Brazal which was recently completed by them to the order of Messrs. Auguisto Lewis & Co., of Rio Grande do Sul. This ship is the outcome of much experience by the owners who aim at passenger and cargo carrying traffic in waters of restricted depth. Much consideration was given as to the choice of propellers, whether paddle or screw, and eventually twin screw propellers in tunnels, with race-adjusting means on the Yarrow principle were decided on. The vessel is 150 ft. long by 25 ft. beam, the contract speed 10 miles an hour on not more than 3 ft. draught, carrying a load of 70 tons. Rejection was to follow if the draught were exceeded by 2 in. or if the speed were less than nine miles. We understand that on her trials her draught with full load was 2 ft. 11 in. and her speed one mile more than contract. She will be the first vessel of her kind in the inland waters, in which she is to ply and from her headquarters she is fitted for 60 first class passengers, with good sleeping and dining accommodations. She is lighted with glow lamps throughout, has promenade deck, one cabin de luxe, a steam winch for handling cargo, and accommodation for officers and crew which is comfortable and well ventilated. Twin screws, compound machinery, with surface condenser and boiler have been supplied by the Vauxhall iron works. The propeller blades which have adjustable pitch are of manganese bronze.

The vessel was recently tried at Long Beach, when about 40 friends of the owner and of the directors of Messrs. Edwards & Co., the builders, interested in the type of vessel, attended. Temporary bulwarks were fitted, and the vessel is now well on the way to Rio Grande do Sul, and will no doubt fulfill the aspirations of her owners.



SHALLOW DRAUGHT STEAMER BRAZIL.

A CARGO OF BANANAS.

(From the New York *Evening Post.*)

The person who happened to stroll on to pier A today was bound to sniff suspiciously at the many smells that permeated the air—strange smells of foreign lands, that suggested the long sweep of a white sandy beach and the graceful droop of palm trees—the aromatic hint of the coffee bean, the fragrant sweetness of rare woods, and another odor, strong and rancid, that required investigation before it could be satisfactorily explained.

Alongside the wharf lay a long, disreputable looking vagabond of the sea, of a pale terra-cotta hue, broken out, here and there, with violent patches of red where the overlayer of paint had worn off. From her peak the three-broad stripes of the German ensign flapped lazily in the North river breeze, and her whole air was one of careless ease, expressing, it is true, a suggestion of latent efficiency—the nonchalance acquired by many tough battles with West Indian hurricane and tempest. On her bows was inscribed in grimy white letters Graecia.

But the chief interest was not in her appearance, for it was from her capacious hold, lying invitingly open in the glare of the sun, that the strange, rank odor emanated—from her hold and from the cartloads of cargo that were following each other in a never-ending stream across the scales at the gateway. They were bananas, huge bunches of them, in enormous piles and stacks, every one as green as grass, and as fast as a wagon was filled with the bunches of fruit another came alongside and took its place. Gangs of men were at work keeping the stacks on the wharf undiminished, and as they worked they panted in unison, in a sort of endless, sliding chant, "e—yuh, e—yuh, e—yuh-h-h!" grunted out as the bunches were handed to the next man in the chain.

Every now and then there would be a warning yell and a cluster of fruit traversing the chain would suddenly fall to the deck, while the men around it danced violently in seeming emulation of a Zuni snake dance. And that was what it really was. Perhaps they had found a fer de lance, the deadly little reptile of the Antilles; perhaps the dreaded tarantula. Whatever it happened to be, the stranger was quickly stamped to death, and work went on just as methodically as before. No one wore gloves; no one seemed to be especially bothered or nervous. The next time the incident happened the same scene was repeated, and work was resumed in exactly the same way. Down in the Graecia's hold the pests were met with even more frequently, and in the semi-darkness, at that.

THE FRUIT AISLES BELOW DECK.

On all sides, hanging in frame compartments, in long aisles and passages, stretched the rows of fruit, showing a weird, washed-out greenish tint in

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the darkness. Once in a while, when the swell of some passing steamship struck the vessel's side, they all dipped forward in unison, and to those passing along the green corridors it seemed as though the fruit were trying to brush them aside. Back and forth swung the green walls, and a warning rustle greeted the ear of him who was bold enough to brush against them. It was not a pleasant place for a stay. It was too dark; the odor of the unripe bananas was too oppressive. The sunlight was welcome at the foot of the companionway.

"How much ve got?" repeated the second officer, a round, chubby little Teuton, with a mild, bronzed face, adorned with a pair of bristling moustaches and imperial. "Um—ve got—how much ve got, Heinrich?" he appealed to the third officer, a duplicate, save for a hooked nose.

"How much ve got?" repeated Heinrich, sapiently. "Ve got—I be dommed if I know how much ve got! Owgust!" he bellowed. "Ach, Owgust! How much bananas ve got?"

Owgust, a meek appearing quartermaster, ambled over to the rail.

"Ach, ve got about twendy tousand bunches. Oftentimes we takes tirdy tousand, aber dis time ve ain't got so much. Ja, about twendy tousand, dis trip."

"Ach, ja," repeated the two officers, together, in comic opera style, and simultaneously removed their white caps. "Twendy tousand bunches."

"You see," said the third officer, "ve comes from Santa Marta last week, about six and a half days—pretty quick time, not so. Aber, perhaps you haf been in Santa Marta? No? Vell, it iss in Colombia, somevere. So far as I sees, der iss not much but der name. On der shore iss some houses, aber not much, mit two long jetties to vich der fruit steamers ties up. Den der iss de beach, long unt vite, mit much palm trees, all ofer it. A railway, not like vot you haf here, comes down too. Dot iss der vey dey brings der bananas. Ven a steamer comes in she sends vord to plantations, saying she vants so many bunches, so much from dis man, so much from anoder, unt so on. Den dey ships dem down by der Ittle railroad und puts dem aboard mit a machine, like a long belt, vich carries der bunches into de hold, vere de men stows dem avay. Und dot iss all, aber sometimes they goes spoiled unt den ve haf a bad smell. Dot iss not goot.

MANY PLACES LIKE SANTA MARTA.

"Dere be lots of places like Santa Marta in Colombia. Ja, much places and most of dem iss name—dot iss all. Dere iss one place, vot ve calls Sabaranca, vere ve goes to get coffee. Dere iss nothing but a few houses unt der jetty, a mile long. If it vere not for der jetty, you could not see der town. Such a funny place. But all der places in Colombia iss better dan de Haytian ports. Dey vas awful, ve can't say how much. Yust awful. Dey ain't towns, not at all, unt der peoples vot lifs in dem, dey ain't peoples like ve knows. Ven you gets to a Haytian town all you see iss some sticks, up in der air, unt on dem iss laid some boards, unt dem dey calls houses. Such it iss. Only vun good house I sees in Hayti. It iss a church in Miragua, unt it iss pretty near as big as der rest of der town.

"Der French missionary who built it, he told me he vent all ofer der vorld to beg der money fer it, unt it iss handsome. Ja, der biggest building on der island. De rest of der big houses vot der French left, dey are in ruins—der peoples is such lazy hogs. Now, you take Cuba, der peoples dere is not der same. You see a difference so soon as you get there. Yust put Havana beside Port-au-Prince or Santiago de Cuba mit Miragua. Ja, dot iss some fun. Ve don't mind sailing around, eferywhere dere iss cargo. Dot iss der sailorman's business, but it is not vot you calls fun to go by places such as dem. Ach, I vish ve had done mit dem. Der run to Hamburg (he said Hombourg), now, ach! dot is somethink. Vun veek you vas in New York, aber in two veeks you vas in Hamburg. You sees something, den. Down dere, you cannot efen get anything to drink. It iss——"

"Not so, not so, Heinrich," interposed the second officer, gravely. "Der iss some fine rum in Hayti, unt de red vine—it iss not so bad."

"Ja, perhaps," admitted Heinrich, grouchily. "Vunce, sometimes, perhaps, you gets somethings goot to drink aber not like here—not like New York." And he shook his head, sadly. Suddenly he looked up again, with a smile.

A PARADE IN MIRAGUA.

"Ach, herr, aber you should see der soldiers. Vile ve vas lying off Miragua, dis trip, dey had a parade, one Sunday. First, came der cheneral. He vas not so bad, in a second-hand uniform, vot he stole from some dealer, mit much plumes in his cap, unt about a dozen odders, all on horseback, mit second-hand gold lace. After dem came der soldiers. Der lieutenants, dey carried rifles, aber dey had no shoes, unt much of de rest had sugar canes. Ja, mein herr, sugar canes, unt ven a soldier did not vish to go der vay of his officer, he stops unt argues mit him, vile der parade vaits. Den dey goes on, mostly by dere own vays. Ach, I haf a laughing. Unt how is dis Cuban business, mein herr?

"Ja? Not so? So bad? Vell, I thing maybe der States chumps in unt takes dem up, eh? A good thing, too. Eh, Johann?"

"Nein," said Johann, disdainfully, after several long draws at his pipe. "Dey will not, because dese Americans, dey nefer does vot they should. You vatch me, by dis. Dey vill do nothing."

"Pah!" replied Heinrich, excitedly. "I tell you I know better. Vot a stoopid thing to say, aber vy should not de States chump in? Dey got de Canal, dey got Porto Rico, dey vill get Santo Domingo, and Hayti, or I vill gif up my yob mit nervousness, some day, unt of course dey gets Cuba. Dot iss vot dey vaits for, you see."

"Nein," proclaimed Johann, wisely. "Vere, do you think, iss der Kaiser? He iss not a little mans. Pooh!"

Seeing that the inevitable was at hand, Heinrich again summoned Owgust, dispatched him to the steward for a black bottle of the reviled Haytian fluid, and settled down to argue the matter out with his stubborn chief. It was rather warm in the little cabin, but who cared. Was not the honor of Germany and Heinrich's knowledge of human nature at stake?

DECISIONS REGARDING LICENSING OF VESSELS.

The collector of the port of San Francisco has just received a decision from Washington regarding the clearing of vessels that carry passengers without a license. The point was raised some weeks ago by Andrew Furuseth, president of the San Francisco Seamen's Association, who demanded the refusal of clearance papers for all such vessels.

According to the decision received, they cannot be prevented from sailing. However, word can be sent to the port to which they are destined, and the captain can be arrested there for carrying passengers without a license.

A decision has also been received regarding vessels that carry passengers, but not for hire. It is held that such vessels do not need a passenger license, and are not compelled by the law to carry life-saving appliances.

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THE MARINE REVIEW

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AN OBJECT LESSON.

The Massachusetts Institute of Technology is one of the most famous, and one of the best, schools of its kind in the United States. We are pleased to learn, therefore, from the *Boston Transcript*, that the students in the naval architectural department of that institution are very much interested in the prize contest started by the Merchant Marine League of the United States, many of the students having entered into the competition for the four prizes of $400, $300, $200 and $100 offered by the League for the four best essays on how to build up our shipping in the foreign trade.

We should imagine that these students would feel an especial interest in this prize contest, because of the following very interesting and significant facts taken from the *Transcript:*

> That such a subject should be of interest to the graduates from the naval architectural department at the institute is that the demand at the present time for men so trained is very small in this country. About the only work that is done of this sort is on the construction of vessels for the United States navy. The output of vessels from the ship building yards of vessels other than for the government is small compared with the output from some of the foreign plants. If an increase were made in American shipping, there would be a like increase in the number of vessels built, and a greater demand for the naval constructor.

It is further pointed out that of 125 graduates from the naval architectural department of the Massachusetts Institute of Technology, during the past ten years, but twenty-five are employed at ship building, fifteen in private concerns, and ten with the United States government. In addition it appears that, so high does the institution in question stand, the government is each year sending to it graduates from the naval academy at Annapolis, and the latter are given first choice, of course, for government construction. Sixteen of these naval academy graduates are now attending the course of the naval architectural department of the Massachusetts Institute of Technology, which greatly will circumscribe the field for the employment of civilian architects by the government, practically the only place where permanent employment at naval architecture of the highest grade is now assured in this country.

We should say that the conditions which surround and confront these students in naval architecture afford a most pointed theme for the theses that the Merchant Marine League is offering prizes for, and that the essays put forth by the students at this institute should afford some very practical and pertinent suggestions.

These students will not, probably, forget to note what Thomas Jefferson said in his report on the privileges and restrictions on the commerce of the United States in foreign countries, made late in December, 1793, to the congress of the United States, at the latter's formal request, one of the paragraphs, particularly pertinent to this point, being as follows:

> To force ship building is to establish ship yards, is to form magazines, to multiply useful hands, to produce artists and workmen of every kind, who may be found at once for the peaceful speculations of commerce and the terrible wants of war. * * * * For a navigating people to purchase its marine afloat would be a strange speculation, as the marine would always be dependent on the merchants furnishing them. Placing as a reserve, with a foreign nation or in a foreign ship yard, the carpenters, blacksmiths, calkers, sailmakers and the vessels of a nation would be a singular commercial combination. We must, therefore, build them for ourselves.

We commend the foregoing not only to these students of naval architecture but to the Democrats of the United States, who profess to revere Thomas Jefferson as the great founder of their party; and the quotation from his famous report should be especially interesting to those Democrats who so glibly argue, nowadays, for "free ships," which means to "purchase our marine afloat," a thing that Jefferson positively argues against, specifically advocating, instead, that "we must build them for ourselves."

Unquestionably the essays that will reach the Merchant Marine League, in response to its prize offer, will be one of the largest, and most interesting assemblings of facts, arguments and opinions on the subject of how best to build up our shipping in the foreign trade the country has ever seen, not even excepting the debates on the subject in our national congress.

DOES SHE SUBSIDIZE?

In the last issue of the MARINE REVIEW we published an extended account, fully illustrated, of the new British Cunard steamship Mauretania, a subject of surpassing interest to all maritime men. This is so for the reason that the ship in question is one of two, which are the largest and swiftest vessels ever put afloat. These are the two ships that were provided for at a time when the people of Great Britain were in what some of her members of parliament described in that body as a "blue funk" over the purchase of over a hundred of the finest of British steamships, whose gross tonnage approximated one million tons, by what was known as the Morgan syndicate, an American corporation capitalized and bonded to the amount of $170,000,000. Fearful that the British Cunard line's ships might be absorbed in that dragon-like "combine" the British government entered into a contract with its officials, whereby the British government agreed to loan the company $13,000,000, at 2¾ per cent interest, for twenty years, to enable it to build these two ships, which were to be the largest and swiftest afloat. The government stipulated that the two ships should be "built in the United King-

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dom," thus showing how much of a "free ship" nation Great Britain really is when fearful that the ships might be "made in Germany." In addition to loaning the company the $13,000,000 the British government also agreed to pay it $340,000 a year for the carriage of the mails, for twenty years, and further agreed to pay the line $750,000 a year as "admiralty subvention," also for twenty years, a total of $1,090,000 a year for twenty years. In passing, it might be worth while to say that, a year after the contract was made, and when the British governmen sold its bonds to raise the $13,000,000, it was obliged to pay 3½ per cent interest, or ¾ of one per cent more than it charged the British Cunard line.

The British government, and the British people generally speaking, call such assistance a subsidy. Foreign (especially British) ship owners and ship builders, and particularly their agents and representatives in this country, and our own free traders, all say that it is not a subsidy. When the latter are asked if they would commend, endorse, or advocate similar action by our government, in behalf of an American steamship company, the matter takes on an "ugly" appearance; it then becomes a very different proposition; its "graft" features then become apparent. No; we may say, very emphatically, neither foreign ship owners, foreign ship builders, their agents and representatives in this country, nor our own free traders, would for one moment give their countenance to such a "scheme" of "treasury loot." That the British Cunard steamship company has been enjoying this — shall we call it patronage? — subsidy from the British government for a matter of sixty-seven years, your dyed-in-the-wool opponent of government aid, or subsidy, to American shipping in the foreign trade, would like to forget. That the British government has paid into the treasury of the British Cunard steamship company during the last sixty-seven years very much more than the company has paid out for its ships, the opponents of subsidies for American shipping would like to have the American people overlook. When that veteran British member of parliament and world-wide advocate of postal reform, Hon. J. Henniker Heaton said in an American periodical, a dozen years ago, that "early in the (19th) century the British government adopted the sagacious policy of subsidizing the shipping companies which ran vessels to the colonies and the foreign countries," he caused foreign ship owners, foreign ship builders, their agents and representatives in the United States, and our own free traders, real, acute distress.

ANNOUNCEMENT.

The MARINE REVIEW republishes in rear pages of the present issue certain lists of questions in the masters and mates, wheelsmen and watchmen, oilers and watertenders contests now running in the paper. Republication of these lists is due to the fact that the issues in which they were originally published are exhausted. They are republished in order that anyone desiring to enter the competition may procure a full list of questions from the beginning. It should again be stated that these contests will not close for some months, the purpose being to allow contestants to study the questions at their leisure after the close of navigation. Ample notice will be given of the close of the contest.

FREIGHT SITUATION.

The thick fog which settled upon Lake Erie and the rivers Monday seriously incommoded shipping. Lake commerce was practically at a standstill for twenty hours, the fog being so dense that nothing could be seen. Numerous strandings resulted from it. The steamer W. H. Gilbert, of the Pittsburg Steamship Co.'s fleet, went ashore at Avon Point and will have to jettison considerable of her cargo before she can be released, as she is her entire length on a flat rock bottom. The Gilbert was bound from Conneaut to Lorain with coal when she stranded. Mr. Harry Coulby, president and general manager of the company, visited the Gilbert and ordered the steamer to be lightered. She was later released without injury.

The big steel steamers Robert Fulton and George W. Peavey ran aground at the head of Bois Blanc island and the steamer Clarence Black went ashore at Ballard's reef. The steamer Robert Houghton also ran aground at Bois Blanc. Capt. W. W. Smith, of the Pittsburg Steamship Co., superintended the releasing of the Black and Fulton. As stated, the fog was so dense that navigation on the rivers was impossible, and passenger boats were compelled to anchor with the rest. The only thing that moved on the river were the car ferries between Detroit and Windsor, they being guided by ringing of bells on the docks. The delays coming at this time are especially serious, as the number of available days between now and the close of navigation are few.

Ore tonnage continues in good demand and there is practically no change in the trade. Coal cargoes for the smaller vessels are plentiful. Duluth grain shippers are fairly well supplied with tonnage and are forwarding considerable grain, but the market at Chicago appears to be dead. Following are the grain shipments from the head of the lakes:

	Receipts		Shipments	
	Nov. 3.	Oct. 28	Nov. 3.	Oct. 28.
Wheat	1,925,566	1,836,735	1,409,494	2,185,595
Corn	670	6,392	.....	31,182
Oats	186,196	210,156	103,113	219,405
Barley	545,559	443,887	7,355	1,015,095
Rye	27,013	48,485	.....	51,189
Flax	1,322,060	1,197,878	684,647	1,665,040

"DIAMETRICALLY OPPOSITE" AND REVERSE.

"Diametrically opposite" and reverse have one and the same meaning. Diametrically opposite points are points coinciding with a diameter, or points situated at the ends of the same diameter, as N and S are diametrically opposite each other, being situated at the ends of the same diameter. NE and SW are at the ends of the same diameter, consequently they are situated diametrically opposite each other, or they are in reverse directions from each other. Opposite, when used alone, means across the circle, but not through its center, as points situated at the ends of the same chord, or on the chord. NW is opposite NE, being points situated at the end of the same chord. A line from NW to NE is a chord of a circle. To go diametrically opposite on a course or bearing is to reverse the course or bearing. A sailing vessel steers on opposite points of the compass when she is beating to windward with the wind from the same direction.

The first American-built turbine steamer, Governor Cobb, which went into commission last week, will be followed in January by the Southern Pacific Co.'s steamer Creole, in the early spring by the turbines Yale and Harvard for the New York-Boston passenger and freight service, and in the summer by the Eastern Steamship Co.'s steamer Camden. This will make five turbine steamers in commission on the Atlantic coast in 1907.

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AROUND THE GREAT LAKES.

The annual meeting of the Pittsburg Steamship Co.'s captains will be held on Jan. 3, 4 and 5.

Edward Gifford, chief engineer of the little steamer Mary, was killed aboard his steamer recently by his clothing touching the shaft of the engine.

Edward and William Tobin, sons of Capt. Dick Tobin, an old river tug master, are wheeling on the steamer E. C. Pope. They are but two of a whole host of sailors who hail from Malden.

While being towed to the ore dock by tugs at Duluth, the whaleback barge 134 swung against the bow of the steamer Kensington which was lying at anchor, and had a small hole punched in her hold amidships.

Action for $15,000 has been begun in the Milwaukee federal court on the Mills estate, owners of the steamer Nelson, against the steamer Milwaukee, which sunk the Mills in collision in St. Mary's river with a loss of two lives.

M. H. Mahon, one of four brothers who have made a profession of steamboating, is mate on the steamer E. C. Pope with Capt. Forrest Maloney. Mr. Mahon started sailing in '94 on the steamer Iron King.

The steamer Alva was cut down by the steamer Wisconsin at the government South Pier at Sault Ste. Marie and settled on the bottom. The Wisconsin had two plates and three frames badly crushed and bent on the starboard bow.

Capt. Thomas Donnelly of Kingston, has made a settlement with the underwriters of the steamer John B. Cowle which sunk the steamer Erin in St. Clair river in May. J. & T. Conlon, owners of the Erin, received $18,500 from the underwriters.

The Zenith Transit Co., owning the steamer Hoover & Mason, has libeled the steamer Scranton for $10,000 in the Buffalo federal courts for services rendered the Scranton by the Hoover & Mason when the former was disabled on Lake Superior Dec. 14.

John Brown, of Amherstburg, Ont., who sailed most of this season as second mate on the Fayette Brown, is now working in the same capacity on the steamer E. C. Pope. Mr. Brown sailed on the same boat in '91 as second cook, with Capt. Minar.

Capt. Peter Edgar Sr., who died at the residence of his daughter, Mrs. P. G. Fiander, Cleveland, recently, was a well known lake man. He sailed the lakes for over thirty years, one of his achievements being the taking of the schooner Narragansett to Liverpool in 1866.

Four Malden sailors are scheduled to join the ranks of the benedicts this winter. Maurice Herman, of the E. C. Pope; Patrick McCarthy, of the City of Bangor; Louis Belcours, of the Castalia and Joseph Meloche, of the E. C. Pope, are the ones.

The Great Lakes Engineering Works, Detroit, is making extensive alterations on the old package freighter Conestoga, which has been sold to the Corsby Transportation Co. The old style arches will be cut down flush with the rails and cabin accommodations will be provided for about fifty passengers.

Mr. A. P. Lundin, representing the Welin Quadrant Davit for life boats, is in the great lakes region demonstrating the device to local steamboat inspectors. Only two men are required to sink the Welin davit, cranks being used, and it is possible for passengers to board before the boats are lowered.

Wm. Dolan, of Buffalo, who is a fireman on the steamer William G. Pollock, has a claim on fame which has been made possible through his own efforts. He is what might be called a wonderful artist. One of his chief diversions is to use oils or water colors in painting marine pictures.

With a cargo of 393,000 bushels of flaxseed, the steamer James Laughlin came into Buffalo recently. While the actual weight of the cargo figures less than the grain brought in by the B. F. Jones, there has never been any boat which carried so much before. Capt. Symes would have reached Buffalo earlier if it had not been for low water.

Capt. Ed. D. Gatfield, master of the steamer Wm. P. Snyder, brought that big ship into Buffalo one morning recently with the biggest cargo of wheat ever transported down the lakes, having aboard 380,262 bushels. It was thought the B. F. Jones would at least equal this, but she fell shy a few hundred bushels. The Snyder was down to 19.7, about the same as the Jones.

The sand sucker John M. McKerchey which was built by the Great Lakes Engineering Works for John M. McKerchey, recently carried a cargo of lumber from Munising to Detroit. The McKerchey is a curious craft to look at, but when her owner ordered her he intended her to be put to a variety of uses, and lumber carrying is apparently one of them.

Contrary to newspaper reports, the steamer James Laughlin did not scrape the bottom when she brought her big 393,000 bushel flax cargo into Buffalo last trip. The MARINE REVIEW'S representative watched her being towed to the Eastern elevator from the harbor entrance. She did not scrape once.

Supt. R. R. Richardson of the Pittsburg & Conneaut Dock Co., entertained the Engineers' Society of Western Pennsylvania at Conneaut recently. Nearly 300 engineers from Pittsburg visited the docks and were greatly impressed with their physical equipment. The Conneaut docks hold the record for dispatch and are not likely to be disturbed in this particular for some time.

The whaleback barge Berkshire broke away from the steamer Bay State off the Virginia Capes recently. She rode the storm out successfully, however, at anchor. The Berkshire was formerly the J. S. Russel and the Bay State was the J. L. Colby. Both are lake boats and were sold to the Boutelle Transportation Co. by the Pittsburg Steamship Co. two years ago.

The steamers Iroquois and Chippewa are being fitted out at the yard of the Detroit Ship Building Co. for their long journey to the Pacific coast. The Chippewa will be towed from Montreal to New York by the Iroquois and there fitted out to operate under her own steam. Capt. John J. Johnson, representative of the Alaska Steamship Co., Seattle, will take the steamers to the coast.

Capt. Don J. Duncanson, master of the steamer Geo. L. Craig, has been with the Adams interests practically ever since he started sailing. He sailed the Spinner, Jesse Farwell, Langham and has been on the Craig three years. He sailed the Ira H. Owen for three years. He has been sailing eighteen years. The Craig has carried twenty-four loads this season.

Capt. James Cunningham arrived at Buffalo recently with the steamer Mohegan, which carried a cargo of lumber, and with the statement that he had established a lumber-loading record. The Mohegan carried 1,202,815 feet of lumber. The captain says he loaded his cargo at Holland & Graves dock at Byng Inlet, Canada, in 17 hours, an average of 71,000 feet per hour. The cargo was valued at $27,045.

Examination of the steamer Wm. Nottingham in dry dock at Toledo shows that the damage inflicted by the collision with the steamer Carnegie consists of sixteen broken plates on the starboard bow; two cast iron hawse pipes broken and starboard anchor gone; decks buckled up and eight plates broken, necessary to come off, under the fore foot beneath the collision bulkhead. It will take about four weeks to complete repairs.

Unloading the modern leviathans at the Buffalo elevators is developing into rather a difficult proposition. Last week, the steamer Wm. P. Snyder went to the Union elevator to el-

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evate a few thousand bushels of her record wheat cargo. The leg was lowered into the after hatch and the boat was so long, she extended beyond the Bennett elevator and the Evans slip. It would have been absolutely impossible to unload at the Bennett at that time.

Capt. James Davidson has sold to Chesbrough Bros., of Bay City, the wooden steamer Cartagena. The Cartagena will be renamed the Keewadin and will be taken to the coast and placed in the coal trade. The steamer is 241 ft. long and 40 ft. beam. Chesbrough Bros. have already put the lake boats Kennebec, Madagascar and Keewenaw in the lake trade.

The Alaska Steamship Co., Seattle, Wash., has purchased the steel passenger and freight steamers Iroquois and Chippewa from George Craig and George T. Arnold. Both these steamers are of excellent model and were built at the Craig yard at Toledo. Both steamers will be taken immediately to the Pacific coast. The Chippewa was built in 1900 and is 170 ft. keel, 34 ft. beam and 15 ft. deep. The Iroquois was built in 1901 and is 250 ft. over all, 214 ft. keel, 34 ft. beam and 21 ft. deep. The deal was closed by Mr. G. H. Lent of the Alaska Steamship Co.

Big boats like the steamers Laughlin, Jones and Snyder are not expected to make more than a certain speed, but there are people at Buffalo who declare the Snyder can run ahead of either of the others at her normal gait. If the Snyder had not been held up on the last trip, there was a chance that she would have started about the same time the Jones and Laughlin did. As it is, she got away twelve hours later. Capt. Gatfield, of the Snyder, Capt. Symes, of the Laughlin, and Capt. Ennes, of the Jones, are all willing to bet on their boats.

The Mataafa will be out of drydock about the close of navigation, but all winter will be required for finishing the work on her. The old deck house has been razed and a new one must be built as well as the refitting of the forecastle. A new bow has been built on her, necessitating new framing on the starboard side as far back as the collision bulkhead, as well as some on the other bow. The damaged plates on the bottom have been removed and new ones substituted, a new sternpost is in place, and the plating set. Where possible the framing amidships has been straightened up, and the new framing necessary has been put in place, so that on the whole the wreck is beginning to look like a boat again.

Power cables stretched across the Niagara river from the Canadian to the American side, just above the Buffalo ferry street landing, are being complained of by vessel owners whose craft go to North Tonawanda. It was stated last Friday by a well-known vesselman that a movement is already under consideration to petition the government authorities at Washington to have the cables placed higher than at present. Vessel owners claim there is danger to passing vessels. Since the cables were stretched across the river, vessels passing up and down the stream have found it necessary to exercise the greatest care in avoiding a collision between the masts and the cables. The mast of the schooner Ed. McWilliams struck the cables one night recently. A section of the mast was torn off and hurled to the deck below, narrowly missing two deck hands.

The following changes have been made in the personnel of the Pittsburg Steamship Co.'s fleet: Capt. C. Gegenheimer of steamer Queen City transferred to command of steamer Edenborn. Capt. F. C. Watson of steamer Maruba transferred to command of steamer Queen City. Capt. C. S. Boyce of steamer Mather transferred to command of the steamer Maruba. George G. Burt, mate of steamer Morse, promoted to command of steamer Mather. Mr. Thomas McKenzie, formerly chief engineer of the Corsica, is out of the service. Mr. Wm. Hasler promoted from assistant of the Stephenson to chief of the Corsica. Mr. D. Fraser has been transferred from chief of the Harvard to chief of the Houghton. Mr. George Lynn has been transferred from chief of the Houghton to chief of the Mataafa. Mr. A. L. Eggert has been appointed chief of the Ream.

Capt. Edward Hendricks, of the steamer Harlem, has come to be known among his friends as the head of a happy family and the director of what sailors call a "home." He has a second engineer, George Treleaven, who is never known to go ashore except on urgent business and a chief engineer, H. A. Percival, who worked up to his present berth since they have been together. Ed. Burke, watchman, graduated from the deck house, as did also Warren Cadwell, one of the firemen. Ed. Burlow, the mate, acts as banker for several of his ordinary seamen. The Harlem is supposed to be one of the fastest boats on the lakes. She runs twelve miles loaded regularly, and if put in a corner could make fifteen, it is said. She has carried twenty-two cargoes since the last of May. Albert Koshubosky is second mate of the Harlem.

GRAIN LOADING RECORD.

Canadian Pacific elevator "B," Fort William, beat all previous grain loading records of the great lakes recently when they loaded the steamer W. D. Matthews, Capt. James Ewart, with a cargo of 200,000 bu. of No. 1 northern wheat in 1 hour and 58 minutes, or at the rate of 1,695 bu. per minute.

The best previous record was made by the Great Northern elevator, Duluth, when they loaded a portion of the cargo of the steamer James Laughlin, amounting to 208,000 bu., in 2 hours and 40 minutes, or at the rate of 1,300 bu. per minute.

In this connection it must be remembered that this 208,000 bu. was only a portion of a full cargo of 374,000 bu., and consequently did not need any trimming, therefore there is no comparison between that record and the one made by elevator "B," as the 200,000 bu. constituted the Matthew's full cargo and required the full amount of trimming, all of which takes extra time. It must also be noted that when the Matthews started to load there was not one bushel of her grain weighed up in the elevator; had it been, the time could have been cut nearly in half.

The Canadian Pacific elevators at Fort William are under the able superintendence of Mr. J. A. Sibbald, who, in making this record, has established for himself a first place among the elevator superintendents of the lakes.

COAL UNLOADING RECORD.

Following is the coal unloading record of the steamer Henry S. Sill, Aug. 20, 1906, at the Northwestern Fuel Co.'s No. 1 dock at Duluth:

Started to unload at 7 A. M., Aug. 20, with two rigs. In the first ten hours 4,049 tons were unloaded, an average of 202.45 tons per hour per rig. Work was stopped at 6 P. M. and resumed again at 7 A. M. on the 21st. The entire cargo, consisting of 7,262 tons, was unloaded at 5 P. M., making the unloading time 19 hours, taking out an hour at noon time each day. The average rate of unloading, therefore, for the entire cargo was 191.1 tons per rig per hour.

The Cunard Steamship Co. has been awarded a grand prize at the Milan International Exposition for models of their steamers Britannia, Lucania, Campania, Carmania, Lusitania and Mauretania. These models are beautiful specimens of their kind, and afforded opportunity for very interesting contrast of steam vessel construction from the building of the Britannia to the Lusitania.

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ORE SHIPMENTS.

The record made by the ore-carrying fleet during October last is certainly surprising. The fleet moved 5,062,794 tons, an increase of 805,785 tons over the movement of October last year. The total movement to November 1 is 33,238,835 tons, an increase of 3,508,220 tons over the movement for the corresponding period last year, and is within 234,953 tons of the total movement for last season. These figures prove that prophets are without honor in the ore trade. It is a trade of such surprising possibilities that one requires more than ordinary imagination to keep pace with it. Two months ago well-reckoned estimates were that the total movement would fall under 36,000,000 tons. It is clear now that it will pass the 37,000,000-ton mark, and what with the all-rail shipments, is likely to crowd, if not pass, the 38,000,000-ton mark. From Nov. 1 until the close of the season last year the fleet moved 3,746,289 tons. It is manifest that they will move a greater quantity than this between Nov. 1 and the close of navigation this year. It is quite probable that the vessels will move sufficient during the balance of the season to bring the total shipments by water to 37,500,000 tons. The total movement altogether, including rail, would upon that basis be about 38,300,000 tons. Following are the shipments by ports:

	October, 1905.	October, 1906.	To Nov. 1, 1905.	To Nov. 1, 1906.
Escanaba	620,567	697,068	4,545,922	4,967,360
Marquette	371,376	363,481	2,631,210	2,509,286
Ashland	447,580	413,029	3,033,774	3,049,054
Superior	707,629	904,571	4,574,407	5,352,745
Duluth	1,108,598	1,620,828	7,895,976	9,955,216
Two Harbors	1,001,259	1,063,817	7,049,326	7,405,174
	4,257,009	5,062,794	29,730,615	33,238,835
1906 increase		805,785		3,508,220

SITUATION AT BUFFALO.

Buffalo, Nov. 6.—Vessel owners are asking why this port is discriminated against by the railroads this fall, after it has given them more business than perhaps any other city of its size in the country and has made itself so necessary to them in so many ways. After years of cutting us short in the fall of the business we are entitled to, by failing to provide the cars needed to relieve the elevators, the roads issued a manifesto not long ago refusing to accept any grain until further notice. There was so much grain already under contract that the roads were content to take care of that only and let the shipper without a contract stay out in the cold.

Of course, grain shippers made haste to shut off their shipments as soon as possible, but many were caught. A notable case is that of a northwestern wheat shipper who had sold 7,000,000 bu. to be delivered in New York on a certain day, never supposing that he would be held up here. Vessel agents now advise shippers that the point of difficulty is here and warn them to make sure of their transportation east of here before they make their sales for shipment over this route.

This policy of the roads has, of course, cut down the amount of grain coming in here and though there is more coming in than there was through the summer, the day of the blockade, with several million bushels waiting for elevation, is over till some new tack is taken. It may possibly be said that it is just as well to give shippers notice beforehand of what they are to expect, but that is not the whole of the story. The big steamer W. A. Rogers lately took a cargo of wheat for Erie and accepted a freight a quarter of a cent a bushel less than the Buffalo rate, because she was promised prompt elevation. She carries enough to fill the two elevators there unless they are pretty empty at the start, so the thing was easy.

What Buffalo is unable to see is that the Pennsylvania railroad has cars for Erie when it has none for Buffalo, though it has much more business here than it has in Erie and a big elevator besides. What would the interstate commerce commission say of this way of allotting cars under the new law? Buffalo no doubt does a bigger business in grain over the Pennsylvania railroad than at Erie but the requirement is very much more.

It is from this state of things that we are so anxious for the completion of the barge canal. Even a good-sized canal fleet of the old 8,000-bu. size would save this port from such a stoppage as exists here now. As it is the little fleet is getting rich on a five-cent freight. What a harvest there would be for a good fleet of 33,000-bu. boats! And it is said that with them there would likely be more cars than there are now. If such a fleet could get a good fall business at even three cents a bushel it could afford to go very slow during the summer months when the roads are taking the bulk of the freight.

Still the roads do not hesitate to oppose canal enlargement in the face of such a falling down as they are confessing to here now. There is not the slightest indication that they are preparing to remedy the defect of car shortage in future years. On the other hand, it grows worse every year. Not only are grain shippers complaining, but every shipper of whatever class, this fall more than ever and last fall more than previous falls. The worst of it is that the barge canal will be several years building. It has been said by railroad men that by the time it is finished the roads will be as far in advance of it as they were of the old canal, but it must be confessed by everybody that things do not look that way now.

The fact is that it will never pay again for the roads to provide cars enough to move the freight at overflow times. The earning of a car per ton mile is so much less than it used to be that it would be a losing investment to provide cars to be used two or three months now and then stand still the rest of the year, for they would not be able to get any higher freight than the cars that run the year around.

But water freight, unless based on rail rates, always fluctuates. The boat that has been obliged to lay up during the slack period can still make money enough on its late cargoes to do well. The extra freight car cannot do anything of the kind and it is a loss to the road that owns it. Why, then, is that road going to provide a certain loser in that way? Does it care so much for the public welfare? No, it is the water-route alone that can prevent fall blockades, and the country will never be safe until it provides such facilities. New York hesitated a long time before committing itself to such a policy, but it made the chief mistake in waiting.

JOHN W. CHAMBERLIN.

SHIP FLOORING.

One of the needs aboard ship is an economic and sanitary flooring. This need appears to have been solved by the substance known as "Sawdolet", manufactured by the C. Clemente Co., No. 1722 Oregon avenue, Cleveland. Sawdolet is a floor that is in every manner applicable to a steel deck without any expensive preparation. It is sanitary, of monolithic character, laid in one sheet, with either gloss or mat surface. M. C. Clemente, who has introduced this floor and brought it to its present state of perfection and applicability to steel decks, has had years of experience in Parma, Italy, where the flooring is a standard article in the building trade, being used extensively in residence construction, for halls, baths, vestibules and kitchen floors.

In way of description it may be said that Sawdolet is a plastic substance about the consistency of mortar, made of pulverized and granular wood fibre, and mineral substances, colored by the admixture of various oxides to the desired tint or color.

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The material is laid directly on top of the rough wood floors in ordinary building construction. Owing to the unequal contraction and expansion between Sawdolet and steel the flooring is laid directly on the steel deck, having rough-sawed hardwood cleats ⅜ in. by 2 in. bolted to the deck 12 in. to 14 in. on center, with bolts spaced 12 in. to 14 in. The material is laid ⅜ in. thick, forming one continuous floor of the area of an ordinary room, coving two inches at junction with upright walls.

This floor is not only fireproof but impervious to liquids, dust and vermin of all kinds, a poor conductor of heat and sound, easily cleaned, and withal neat and sightly. The material is elastic, warm and practically indestructible with any ordinary use.

This company has recently completed 1,250 sq. ft. of flooring for the Pittsburg Steamship Co. on the steamer Douglas Houghton and now has an order from the same company for 2,000 sq. ft. for the steamer William Edenborn.

This flooring is also being installed on three steamers now building at the Lorain and Cleveland yards of the American Ship Building Co., approximately 2,000 sq. ft. for each steamer. Among the buildings recently supplied with this flooring are the two apartments on Hanna Place, north of Euclid avenue, for Messrs. Brown & Nims.

The company will be pleased to show samples and submit estimates of the work or to display the flooring in place to any one interested.

BALTIMORE SHIP YARDS.

Baltimore, Nov. 7.—The plans for the derelict destroyer, authorized by the last congress, are now being prepared in the local office of the United States revenue cutter service. The vessel, which will be especially adapted for the work of patroling the beach in the roughest weather seeking derelicts, which she will either tow into the nearest port or destroy by means of guncotton, will be flush-decked and will somewhat resemble the newest of the steam cutters. She will be 204 ft. over all, 34 ft. beam and 19.6 ft. depth of hull, drawing 17 ft. She will have a complete electrical plant, including a wireless telegraph outfit. The size or type of the boilers and engines has not yet been decided upon but she will be powered to give her a speed of about 20 knots.

E. Deibert, of Elkton, Md., who during the past few years has turned out a number of fine coastwise barges has recently completed another, the John T. Donohue, which is now in port receiving her equipment. She is 205 ft. long, 32 ft. beam and 13 ft. depth and will carry about 1,500 tons. Charles Rhode & Sons are fitting out the barge with masts, sails, etc., and installing a gasoline engine for handling cargo. The new vessel is owned by Nathan & Hooper, John T. Donohue and others of this city and William L. Taylor, of Norfolk, Va. She will engage in the lumber trade between the Carolina sounds and the north.

Business along the water front is now in a most prosperous condition and every yard has much work on hand. Most of the work is in the nature of repairing and overhauling of bay craft preparatory to the winter season. The Maryland Steel Co. has the Baltimore, Chesapeake & Atlantic and Maryland, Delaware & Virginia steamers Virginia and Northumberland for overhauling; the James Clark Co. has the Washington steamer, Charles Macalester, for repairs to her boiler; Booz Bros. have the Norwegian steamship Simon Dumois for general repairs; William Woodall & Co. have the Maryland, Delaware & Virginia steamer B. S. Ford for attention to hull and minor repairs; Thomas McCosker & Co. have several bay schooners for refitting and are building a 26-ft. launch hull for stock, and R. M. Spedden Co. has the schooner Cherubim for the replacing of a flying jibboom.

In addition there is a heavy demand for dry docks and every receptacle in the city is swamped with work and many vessels of all sizes are lying in the stream awaiting their turns.

There is also much activity among the builders of pleasure boats. The Nilson Yacht Building Co., is just completing an 87-ft. steamer for Mr. H. B. Schuler, of Chicago, and have in their sheds half a dozen 50-ft. power launch hulls to be completed during the coming winter. C. Durm & Son, in addition to a number of small bay working vessels for overhauling, have in their shed three large power boats that will be launched shortly.

The barge Elizabeth, that went away from Baltimore as a gasoline boat during the latter part of the summer, returned this week as a steamer, having changed her motive power in Philadelphia.

The British steamer Greenbank, of the Horsley line, hailing from Hartlepool, arrived this week on her first voyage to the United States. She was built at Sunderland last spring and made her maiden voyage with coal from Cardiff to Valparaiso, whence she made a trip up the west coast of South America, and loaded 52,210 bags of nitrate of soda for this port. She is 350 ft. long, 48 ft. beam and 30 ft. depth.

Oliver Reeder & Sons are rebuilding the bay schooner William McKenney, which about a year ago sunk near Queenstown, Md., and was raised last week and brought here by the tug Hanson H. Keys. The schooner is 44 tons gross, 67.2 ft. over all, 22.1 ft. beam and 5.9 ft. depth. She was built in 1877 and is owned by Capt. W. Stevens, of Rock Hall, Md.

The British steamship Barnstable that has been running in the fruit trade for the United company between this port and Jamaica will lay up for a general overhauling of engines, etc. The contract will amount to about $30,000.

The bay tug Emma, which sunk in the Potomac river after having been burned and which was subsequently raised and purchased by Philip Weaver & Sons, who had her rebuilt, will be renamed the Grace and will shortly go into commission as a harbor tug.

Cathell Bros. & Co. have transferred the engine and boiler in the steamer Emma K. Reed into a hull of a new tugboat that has been built by Joseph Brooks, of Madison, Md., for Capt. John Reed and the Emma K. Reed will have installed in her a 100 H. P. gasoline engine.

The Marine Railway, Machine & Boiler Works has the tug William H. Mohler at their yard for the installation of a new condenser. The U. S. lighthouse engineer's tug Thistle is also at their yard for an overhauling and a new propeller.

The Italian cruiser Fieramosa, commanded by Admiral Cala, now visiting north Atlantic ports, is expected here about Dec. 1 to undergo an overhauling at the yard of William Skinner & Sons.

MARINE PATENTS.

Copies of these patents can be obtained by sending ten cents in stamps to Siggers & Siggers, patent lawyers, suite 11, National Union Insurance building, Washington, D. C., by mentioning THE MARINE REVIEW.

834,076. Pitch-lock for reversible propellers. Burt N. Pierce, Indianapolis, Ind., assignor of one-half to Carl G. Fisher, Indianapolis, Ind.

834,127. Ship construction. Geo. M. Harroway and Waynman Dixon, Middlesborough, England.

834,234. Ship construction. Geo. M. Harroway and Waynman Dixon, Middlesborough, England.

833,730. Bow-facing oar. William C. Case, near New Boston, Texas.

834,335. Apparatus for coaling ships from colliers. Charles G. C. C. Taylor, Basildon, near Pitsea, England.

834,399. Apparatus for cleaning hulls of ships. Peter D. McLellan and Joseph F. McKinnon, Dorchester, Mass.

834,692. Reefing sails. Max Tornow, New York, N. Y.

834,840. Centerboard. Donald M. McLean, Boston, Mass.

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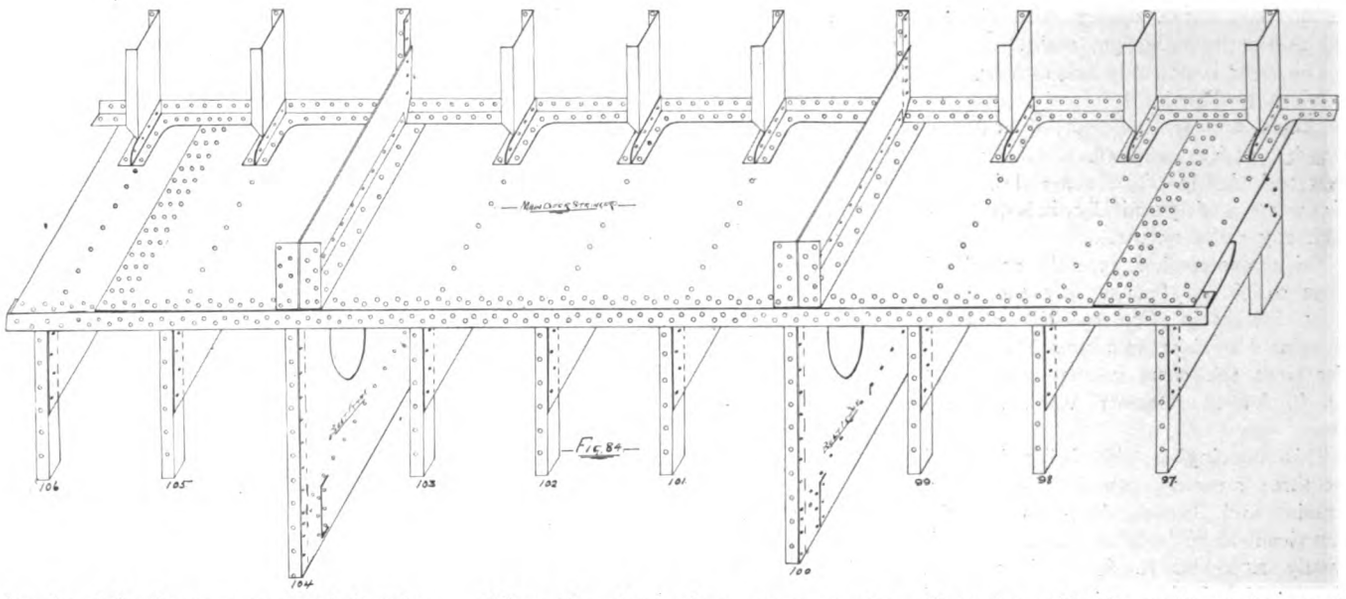
LAKE SHIP YARD METHODS OF STEEL SHIP CONSTRUCTION.

BY ROBERT CURR.

MAIN DECK STRINGER.

Fig. 84 shows main deck stringer plate complete. This plate is 24 ft. by 5 ft. 6 in. by 22½ lbs. and butts between frames 97 and 98 and 105 and 106, taking in eight frame spaces and forming top of side tank.



Frames 100 and 104 are belt frames, the plan, Fig. 84, looking to the port side of the vessel shows the belt cut-off just above the stringer plate.

One flange of the channel side frame is cut off to facilitate the fitting of the water-tight angles around same.

Fig. 85 shows the method of laying off the plate for main deck stringer. A line, AB, is put on the plate and the butts and frames squared from same.

The line AB is parallel to the center line of the ship and a convenient distance from the ship's side.

In this case the line is 2 ft. 6 in. from the ship's side and the mold F applied to the frame 104 is nicked on the edge representing the line AB, as shown at a. The edge nicked is the side to be applied to the line of frame space which is the heel of flange of bracket plate underneath the stringer plate. The mold F is applied to all the frame lines, as shown on frame 104.

Separate molds are used for the belt frame angles in this case, because the belt frame connection to stringer plate is of broader angles than the flange of the stringer bracket plate.

These plates for 85 per cent the length of the vessel amidships are straight, so that they are square for that length of the vessel.

When the plates show curve on the edge the mold G, Fig. 85, is used for making the rivet holes through the stringer plate.

The rounded end of the mold G is applied to the outside line, in this way the holes come in the place just as if a mold was cut for every frame where the bevel changes.

Mold E, Fig. 85, shows the method of marking the rivet holes for the water-tight collars fitted between and around the frames.

The inside edge of the stringer plate D, Fig. 85, has a universal pitch of rivet holes.

Every twelve feet where the double angles come for the belt frames a change of rivet holes is made in way of same to suit the angles.

A batten, two frame spaces in length, is used for the edge of the stringer plate and stringer angle.

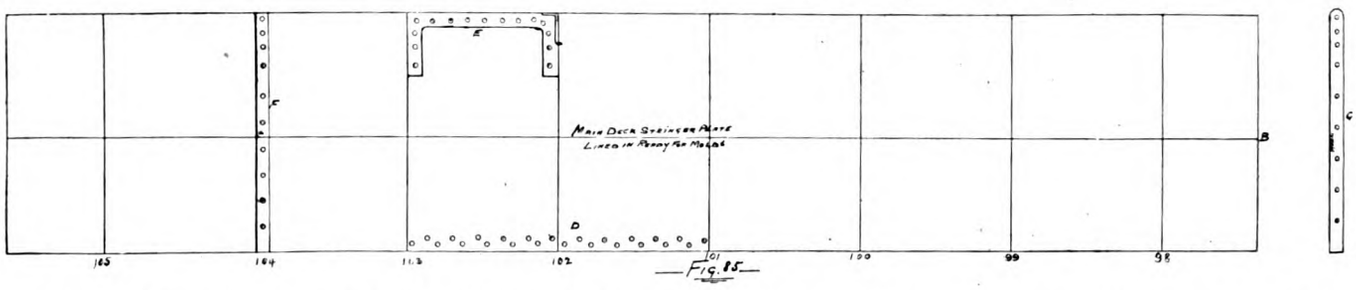
These rivet holes are so arranged that the rivet holes agree with the butt holes, as shown in the illustration, Fig. 84.

Lap butt molds are made the shape of the lap and number of holes as shown on Fig. 84. The lap butt mold holes are so arranged that the mold can be turned over and all the holes agree when the mold is applied, as shown on Fig. 84.

In Scotland the frames would be cut at the deck line, as shown by Fig. 86, dispensing with the smith work around the channels.

The process of marking the stringer plate would be similar to laying off a shell or girder plate. The template would be made on the ship and the inner and outer edges copied on same to get the correct shape of the plate.

When the plate is placed on ship the inner edge angle would be lifted from same, punched, erected and riveted before the water-tight angles are proceeded with and very often the shell plating in way of the stringer plate must be on and riveted before the water-tight work is gone on with.



That is in a case where shoes are fitted but when a continuous angle is put on the angle is all riveted before the shell plating is put in place. The continuous angle on an arrangement of this kind saves labor in fitting of stoppers where liners pass up between the collars on an outside strake of plating and there is less chance of leakage

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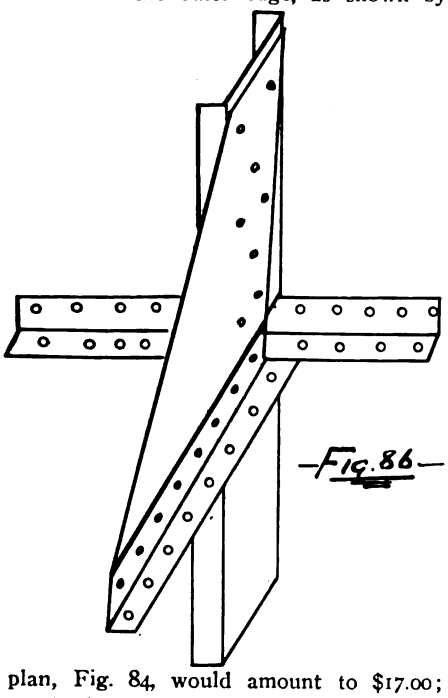
when the continuous angles are used.

The cost of fitting a stringer plate of this description in Scotland, complete with stringer angle on inner edge and collars on the outer edge, as shown by



plan, Fig. 84, would amount to $17.00; on the lakes the price per plate completed would amount to the same price. The smith work costs double here compared to Scotland, likewise everything which is done on the same system as done there.

SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS.

The fourteenth general meeting of the Society of Naval Architects and Marine Engineers will be held in New York on Thursday and Friday, Nov. 22 and 23. Through the courtesy of the American Society of Mechanical Engineers the meetings will be held in the auditorium, No. 12 West Thirty-first street. Following is the program of papers:

"A Fireproof Ferryboat," by F. L. DuBosque, member; "Construction of a Fireproof Excursion Steamer," by William Gatewood, member; "Speed and Power Performance of Albany Day Line Steamer New York," by Prof. J. E. Denton, member of council; "Personal Impressions of Model Towing Stations Abroad," by Prof. C. H. Peabody, member of council; "The Experimental Tank of the University of Michigan," by Prof. H. C. Sadler, member; "Model Basin Gleanings," by Naval Constructor D. W. Taylor, U. S. N., vice president; "Comparison of the Durand and Curtis and Hewins Papers on Propeller Experiments of 1905," by Col. E. A. Stevens, vice president; "A Modern Fleet," by Captain E. B. Barry, U. S. N., associate; "Recent Developments in Armor and Armament," by John F. Meigs, associate; "The Development of War Ship Design," by Naval Constructor R. H. Robinson, U. S. N., member; "Development of Submarines," by Lawrence Y. Spear, member; "The Effect of the Universal Rule on Yacht Design," by Martin C. Erismann, junior; "The Gasoline Engine," by Arthur T. Chester, associate; "Two Timber Dry Docks and Their Pumping Plant," by F. P. Palen and G. L. Smith, members; "A New Sea Anchor for Coaling at Sea," by Spencer Miller, member.

COMMERCE OF LAKE SUPERIOR.

The total movement of freight through the canals at Sault Ste. Marie during October was 7,201,078 tons. The total movement to Nov. 1 has been 44,405,515 tons as against 37,993,930 tons for the corresponding period last year. The October movement is certainly surprising considering the vicissitudes of navigation during the fall months. It is clear that the total movement for the season will surpass 50,000,000 tons, certainly an astounding commerce for a lake that, in a commercial sense, is but one year past its fiftieth birthday. Following is the summary of traffic up to Nov. 1, with corresponding data for the preceding two years:

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

Items.	To Nov. 1, 1906	To Nov. 1, 1905.	To Nov. 1, 1904.
Coal, anthracite, net tons	823,800	749,322	818,998
Coal, bituminous, net tons	6,495,056	4,849,791	3,818,694
Iron ore, net tons	31,307,915	27,852,943	16,134,123
Wheat, bushels	55,556,229	38,697,247	29,426,456
Flour, barrels	4,998,874	3,962,580	3,212,596

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO NOV. 1 OF EACH YEAR, FOR THREE YEARS PAST.

EAST BOUND.

Items.	To Nov. 1, 1906	To Nov. 1, 1905.	To Nov. 1, 1904.
Copper, net tons	88,651	86,414	83,417
Grain, other than wheat, bushels	39,606,805	25,758,292	20,179,276
Building stone, net tons	6,222	8,649	25,611
Flour, barrels	4,989,610	3,962,580	3,212,309
Iron ore, net tons	31,307,915	27,852,943	16,134,123
Iron, pig, net tons	19,054	50,033	36,744
Lumber, M. ft. B. M.	782,695	828,470	782,710
Silver ore, net tons	.....	41	1,313
Wheat, bushels	55,556,229	38,697,247	29,426,456
Unclassified freigt, net tons	136,639	83,189	81,324
Passengers, number	30,936	25,297	18,815

WEST BOUND.

Coal, anthracite, net tons	823,800	749,322	818,998
Coal, bituminous, net tons	6,495,056	4,849,791	3,818,694
Flour, barrels	9,264	7,175	287
Grain, bushels	6,749	3,178	5,541
Manufactured iron, net tons	289,087	132,925	151,768
Salt, barrels	404,688	357,147	329,882
Unclassified freight, net tons	817,042	598,686	490,783
Passengers, number	30,749	27,500	17,602

SUMMARY OF FREIGHT MOVEMENT IN TONS.

Items.	To Nov. 1, 1906	To Nov. 1, 1905.	To Nov. 1, 1904.
East bound freight of all kinds, net tons	35,917,954	31,608,316	19,333,202
West bound freight of all kinds, net tons	8,487,561	6,385,614	6,330,339
Total freight, net tons	44,405,515	37,993,930	25,663,541

Total number of vessel passages to Nov. 1, 1906, was 19,462, and the registered tonnage, 35,553,974.

A NEW JAPANESE LINE.

News has very recently come to San Francisco from Japan that the Toyo Kisen Kaisha, operating the line to San Francisco, has formally inaugurated a new line of steamships connecting Japan with Honolulu and Valparaiso. Some ceremony attended the recent departure from Yokahama of the first regular steamer of this new line, the Kasado, which was formerly the Russian volunteer steamer Kazan. She was sunk by the Japanese at Port Arthur, and subsequently raised and refitted. After being used as a troop ship by her captors, the Kazan was sold to the Toyo Kisen Kaisha, and her name changed to Kasado.

She is of steel, was built in England in 1900, and is 400 ft. long. The Kasado is commanded by Capt. W. C. Filmer, son of Capt. Filmer of the Nippon Maru and well known in San Francisco. Her commander is perhaps the youngest captain of a big liner on the Pacific, but his experience has been extensive. He was formerly chief officer on the Japanese lines coming to San Francisco.

Other Japanese steamers will follow the Kasado on the new Yokahama-Honolulu-Valparaiso line.

REDUCTION IN RATES.—LAKE SHORE RY.

Effective Nov. 1, the Lake Shore & Michigan Southern Ry. will reduce its rates on tickets sold to points in other states. No reduction in cash fares paid on trains to such points, however, will be made. You will save money by purchasing a ticket.

The Cobb-Butler Co., of Rockland, Me., are to build a six-masted schooner for the Coastwise Transportation Co., of Boston. She will be 280 ft. long, 48 ft. beam and 27 ft. 6 in. deep.

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SCIENTIFIC LAKE NAVIGATION

By Clarence E. Long

VARIATION OF THE COMPASS.

THE MAGNETIC DECLINATION IN ALL ITS PHASES. THE APPLICATION OF THE VARIATION TO THE TRUE COURSE. THE VARIOUS MODES OF APPLYING THE VARIATION.

SUGGESTIONS AS TO STUDY.

First read this lesson over carefully several times in order to get a general idea of the rules, principles and the various terms employed. Then, keeping in mind what you have learned in previous lessons, take the study up in a systematic manner; that is, pursue it step by step and persevere. Do not skip about kangaroo fashion, but learn and remember each rule, law and principle involved; and then from your own reasoning form rules of your own. Above all, learn the correct and exact meaning of these laws, principles and rules, which is the first requisite in the study of any branch of science, and without which the study becomes a burden instead of a pleasure. You will find this study a pleasure if you heed the tips here given.

Get the right idea of what variation of the compass means, also true meridian, magnetic meridian and the angle included between them. Remember that an angle is the ends of two straight lines meeting, and its measurement is the arc of the circle included between its sides—measured in degrees or points, it makes no difference. The points of the compass are all angles, for instance, from north to N by E is one point, or 11° 15′; the two lines forming the sides of the angle proceed from the center (of the compass) and the distance at any place between these two lines, or sides, is the arc of the circle, or the number of degrees included within the angle; the correct meaning of the terms easterly and westerly as applied in compass work; what true course, correct magnetic course, true compass, magnetic compass, etc., etc., are. Memorize the rules for the conversion of courses, and reason them out for yourself. Learn to think and think correctly; do not learn the rules parrot fashion, and work through the examples after its wake. When you do anything know why you are doing it; give a reason in your own mind for it. If you do not know why you are doing a thing stop right where you are and with reasoning seek it out; you can do it if you make up your mind to. Perseverance is the true course to success and it makes no difference whether it is the study of navigation or the art of driving mules; they both require a good deal of it.

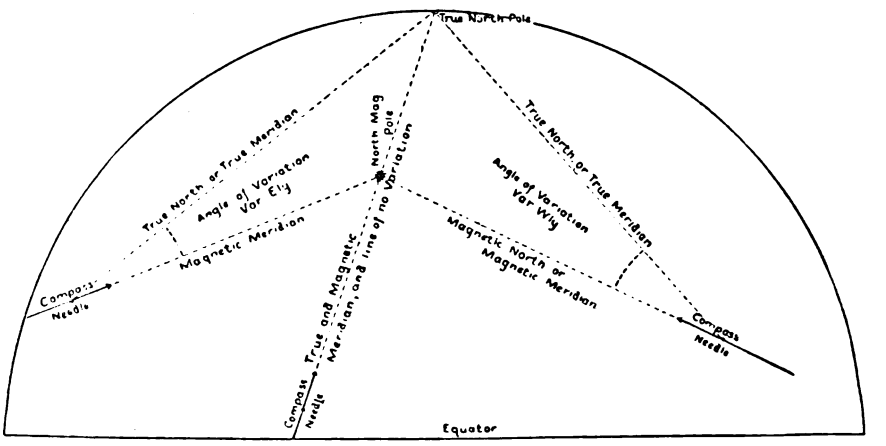
While you are studying one subject, other knowledge, probably something along the same line that you have previously studied, will suggest itself. If it is not clear to you go back through the lessons you have had and search it out. But if it be foreign to that which you have studied, keep it in mind, but do not let it bother you, for it will all come to you as you progress. The study of one branch of knowledge trains several powers of the mind and increases its capacity to master other branches that appeal to these powers. By properly observing the hints given above the right ideas will be excited into the student's mind. Always bear in mind that the first requisite of any branch of study is the acquiring of correct definitions of its laws, principles and rules. The books and teachers in this work must impart this knowledge, and their first requisite is to state these rules and definitions correctly.

HOW VARIATION IS MEASURED.

Variation of the Compass.—The angle which the horizontal magnetic needle, when not affected by deviation, or by local attraction, that is, when under the influence of terrestial magnetism only, makes with the true or geographical meridian, is called variation of the compass. At any particular place the magnetic needle, unaffected by any influence but that of the earth, is found generally not to point to the true north and south poles of the earth, but to have a definite direction to the right (easterly) or left (westerly) of this true meridian. This angle goes through a slow cycle of change at each place, but for each locality it is indicated on charts, and can always be found by easy and simple methods.

COMPASS CORRECTIONS, NOT COMPASS ERRORS.

The *corrections* of the compass (not compass errors) are those quantities which must be applied to the indications of that instrument to obtain the reading that would be given if the north point of the compass card always corresponded to the true north point of the horizon. The first of these quantities is the variation of the compass.


True North Pole
True North or True Meridian
Angle of Variation Var Ely
North Mag Pole
Angle of Variation Var Wly
True North or True Meridian
Magnetic Meridian
Magnetic North or Magnetic Meridian
Compass Needle
Compass Needle
Compass True and Magnetic Meridian, and line of no Variation
Equator

AN IMPORTANT CONSIDERATION.

First, get out of your mind the erroneous definition, given in so many text books, that the compass needle (card) "always points to the north." It does not. It does not point directly to the north star, for the north star circles around the true north as the earth rotates on its axis. Here is the proper definition: "A compass needle is a slender bar of magnetized steel, and always arranges itself parallel to the magnetic meridian." Magnetic meridians run from the north magnetic pole around to the south magnetic pole. This is not true, but it may be so considered. The north magnetic pole is located somewhere in the far northern part of North America. It slowly changes its location year by year; the magnetic meridians change correspondingly, of course, and the compass needle follows them. Hence the north end of the compass points to the north magnetic pole, and the south end points to the south magnetic pole, which is in the Antarctic ocean. At any place on the earth's surface the needle arranges itself parallel to the magnetic meridian of that place. There are very few places on the earth at which the compass needle arranges itself on a true north and south line, and these are slowly but constantly changing their positions; of course, the compass needle follows along and here points out the true directions of the horizon, or to the north star when that body is on the meridian, which occurs twice in the twenty-four hours—once below the true pole and once above the true pole.

It is well known that the westerly variations are increasing, and the easterly variations are decreasing. In other words, the zero line, or line of no variation, is moving westward; more in some places than in others.

IF THE COMPASS TOLD THE TRUTH.

If the compass always told the exact truth it would materially aid in simplifying some of the many problems which make navigation a difficult science; but, unfortunately, this is not the case. Every one who has read much has run across such expressions as, "True as the needle to the pole," (meaning the true instead of the magnetic pole), or "As honest as the compass," meaning, again, that the ends of the compass needle point out the direction of the true poles of the earth.

Now, the compass is generally misleading, though not dishonest, for it does not, and it is not expected, to point out the true or geographical north and south directions of the horizon or to the true or geographical north and south poles of the earth, with the exception only within a few shifting areas, whose combined extent does not amount to one per cent of the area of the globe. The true or geographical north and south poles of the earth (terrestial) are the

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ends of the imaginary axis on which the world rotates. These poles are represented by a mere dot and are 90°, or a quarter of a circle, from the equator (the imaginary, or theoretical, great circle on the earth equally distant from these true poles), and these spots are where all the meridians of longitude cross one another. But they are not the north and south poles of the earth's magnetism, or, as we commonly express it, they are not the magnetic poles. We learn that all magnetic bodies have north and south poles, and that opposite poles of different magnets attract each other. And this is why the magnetism pervading the north magnetic pole, as well as the north magnetic hemisphere, is called south or blue polarity, for it attracts and gives the magnetized north end of the compass needle (or needles) its power of direction; and for the same reason the magnetism of the south magnetic pole and south magnetic hemisphere is named red or north magnetism, for it attracts and gives the magnetized south end of the needle its directive force or pointing power; and this is from whence the magnetism of both poles and magnetic hemispheres derive their names and kinds of magnetism. As has already been explained, the magnetism of the north magnetic pole must be of an opposing kind to that contained in the north end of the compass magnet, or attraction could not take place. Either one would have to give way to the other, so that it was found convenient to give the preference to the magnet of the compass, and call its north-seeking end red or north polarity, and its south-seeking end blue or south polarity. Thus to make the laws and principles of the magnetism of both compass and earth harmonize, the latter had to take names opposite to that given the compass magnet. The magnetic poles of the earth must, of course, be designated according to their location; hence, the north magnetic pole is not named north because of it having the north kind of magnetism, but because it is situated in the far north, or in the direction of north. The same thing may be said of the south magnetic pole.

THE EARTH'S MAGNETISM AND THE COMPASS.

The magnetism of the north magnetic pole and hemisphere may be said to control the north pole of the compass magnet (or magnets) and gives it direction north of the magnetic equator, that is, north on the compass card points toward the north magnetic pole. Similarly, the magnetism pervading the south magnetic pole and hemisphere controls the directing power of the south pole of the compass magnet, and gives it direction anywhere on the earth's surface south of the magnetic equator, that is, south on the compass card points toward the south magnetic pole of the earth. This is not strictly true, but for all practical purposes it may be taken as such. So that anywhere on the earth's surface the compass points out its respective magnetic directions. On the magnetic equator, then, the two magnetic poles of the earth's magnetism should have an equal influence on the two poles of the compass magnet. This is not precisely true for several reasons, but it may be taken as such by the student for the better understanding of the laws and principles involved. Thus, the compass needle, uninfluenced, points to the magnetic poles of the earth, and at all places on the earth's surface, that is, north on the compass points to the north magnetic pole, and south on the compass to the south magnetic pole.

It is absurd then for some sailors to think, let alone say, that as soon as the equator is reached and crossed it is necessary to steer north in order to go south.

The statement that the compass needle points to both magnetic poles of the earth does not mean that they point to both poles at the same time, but in the manner already explained. For how could this be possible when these magnetic poles are not diametrically opposite each other? If the magnetic poles of the earth were like the true poles of the earth then this would be possible.

The north end of the compass needle, then, points to the north magnetic pole of the earth and not to the true north pole of our planet, and hence does not point true north except at a few places on the earth. The magnetic north pole, as we have previously learned, is located in the Arctic ocean, in the vicinity of Baffin's Bay, some 1,200 nautical miles south of the true pole. The magnetic south pole is about 900 nautical miles north of the true south pole.

HOW THE VARIATION FORMS.

You will readily perceive that if you are aboard a ship in such a position that there is an angle between the magnetic pole and the true pole of the earth, the north point of your compass will be turned aside from the latter toward the former. If north on the compass is slewed around then all the other points of the compass must be slewed by the same amount and in the same direction that north is. This is called variation of the compass, and is the first of several corrections* (allowances) to which the compass is subject, and is the first against which the mariner must take precaution. Remember, that it is not only the point north that is affected, but every point of the compass as well, and by the same amount that north is. We use north and speak of north because north true and north magnetic are the two lines forming the angle and responsible for the variation of the compass. To see this as it really exists on points south of east and west you must imagine yourself at the center of the compass looking outward over the point in question.

THE VARIATION DIFFERS IN DIRECTION AND QUANTITY.

In different parts of the world, of course, the variation varies both in quantity and direction. In some places the needle of the compass card points to the right of true north and south, and that is called easterly variation. In other places it points to the left of true north and south, and this is called westerly variation. Again, in some parts of the world the easterly variation is much greater than it is in others, and the same is true of westerly variation. For instance, a steamer following the usual course from Queenstown to Sandy Hook begins with 21° westerly variation, which increases to 30° and then diminishes gradually to 25°, 15°, 10° and finally to 8°. The variation between Whitefish Pt. and Duluth begins with 2° 20' westerly at the former place, and then gradually diminishes to nothing (crossing the line of no variation) some 30 miles to the westward of Whitefish Pt., and then gradually increases to 8° easterly at the latter place.

WHERE THE VARIATION IS LARGE.

There are other portions of the earth's surface where the compass needle points due east and west, and still others where the north end actually points south (north of the north magnetic pole, for instance).

In the Atlantic the average departure of the direction of the compass needle

*Note.—Variation of the compass should not be termed a compass "error," neither should the deviation of the compass be called an "error." True, many books and authorities call variation and deviation compass errors, or errors of the compass, or total errors, meaning the variation and deviation combined. Variation and deviation are corrections, and nothing else, and they are just what any good navigator would expect his compass to show, and what he himself would make due allowances for, that is, he would correct his course for these deflections of the needle. A compass error would be due to some fault or defect in the mechanical arrangements of the instrument, such as the magnets not being placed north and south with the card, a blunt pivot point, causing frictional error, or a crack in the jewel cap. Each of these would cause the compass to be in error, and wrong steering would be the result. But it would have nothing to do with the effects causing variation or deviation of the compass. Compass corrections are then the proper expressions to be employed in denoting the allowances to be made for variation and deviation of the compass. Compass errors when used to signify variation and deviation allowances is an expression that is illogical and therefore meaningless. Bear this in mind and when you hear any one using it in that sense correct him.

How then can variation and deviation be errors when the natural causes and effects are due to well-defined and established laws of physical science? The variation and deviation may be in error when inaccurately found, but when accurately found they are compass corrections. Variation and deviation of the compass are not faults of the compass. They are from influences that a well-made compass should show, whereas a compass in error (defect) would not show the true effects of these influences.

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from the direction of the pole star is 20° west of north, while in the Pacific it is 10° east of north. At the entrance to Hudson Bay the north point of the compass points 55° west, and in the West Indies 5° east of the true meridian; hence, in a voyage along the eastern coast of the American continent, from Hudson Bay to the mouth of the Mississippi river, a change of 60° is experienced in the direction of the compass needle, similarly in a trans-Pacific voyage, from Juan de Fuca to Yokohama, a change of 27° is experienced. And over so comparatively small a stretch of sea as lies between Newfoundland and New York the pointing of the compass needle varies 25°.

THE CORRECT DEFINITION OF VARIATION.

We are thus made acquainted with the variation of the compass, which may be strictly defined as the angle between the true north and south line and the magnetic north and south line as pointed out by a compass needle or other magnetized needle so mounted as to swing freely about a vertical axis or pivot. Or, the variation is the angle between the observer's nearest true and magnetic meridians, or the angle between the magnetic meridian at the place of observation and the true meridian at the place of observation.

Thus we see the necessity in seeking the truth concerning the pointing of the compass needle, upon which the navigation of the seas has rested throughout the history of the world, of first casting aside the old familiar sayings: "True as the needle to the pole," and "as honest as the compass," for, as we have already seen they only hold good in certain localities.

THE VARIATION IS PRACTICALLY STATIONARY.

You will understand that when the variation is westerly it is always westerly; and the same thing is true of easterly variation. The variation is westerly in the north Atlantic and in the Indian ocean; it is easterly in the Pacific ocean, and in part of the south Atlantic. The variation is easterly on lakes Superior and Michigan, and westerly on lakes Huron, Erie and Ontario.

The line of no variation in the lake region is traced as follows: Beginning on the north shore of Lake Superior, near Slate island, its course runs across the lake to Munising; from Munising it makes a sweep around through the vicinity of Escanaba, thence across Green Bay to Rock island; from Rock island it cuts its way across Lake Michigan to South Manitou island and touches the Michigan shore north of Pt. Betsey and thence on down through the central part of southern Michigan (state). The variation is westerly at all places east of this line, and easterly at all places west of this line.

QUEER SHAPE OF THIS AGONIC CURVE.

To trace this line of no variation on an isogonic chart—a chart showing equal lines of variation—would confuse one not familiar with the system of notation, on account of the extreme irregularity of this line along certain portions of it. It is comparatively regular in the region of the lakes. In Ohio, Kentucky, Tennessee and North Carolina the line has the appearance of a man's profile, the nose encircling the eastern portion of Tennessee, the eye in Ohio, and the forehead in Michigan. It must not be supposed that the magnetic needle points out the direction of this line if carried along it. The needle would point true north all along this irregular course. Imagine this agonic curve cut up into small lengths and arranged north and south from the exact place it was taken. Or draw short lines parallel with the true meridian all along this line, and as thickly as you can pencil them in. These little marks will represent a series of small magnetic needles pointing out the direction of the true meridian, and then you will have it precisely as it exists. Bear in mind that the irregular line merely marks, or passes through, all those places on the earth's surface having no variation, or where the compass points true.

THE VARIATION ON THE LAKES.

The variation in the region of the great lakes runs from about 8° easterly at the western end of Lake Superior (Duluth) to about 10° westerly at the western end of Lake Ontario, and as the lines of equal variation run at about right angles to the general course of the lakes, the change of variation is large for so small a change of longitude, and the true course must be correspondingly altered to make good the course, which is the correct magnetic course. The total change as shown above is 18° (+ 8° and — 10°) so that at the western end of the lakes, if it should be desired to steer a true course of west, there being no deviation, the correct magnetic course would be S 82° W, and at the eastern end N 80° W.

ANNUAL CHANGE IN THE VARIATION.

Variation of both kinds is subject to a small annual change in the same direction. It is customary to state the amount of this change on navigation charts, and when it becomes large enough to materially affect the mariner's compass from port to port, a new chart must be issued. You will always find somewhere on the chart some such record as this: "Variation 5° 20′ westerly. Annual increase 3′ 15″." You see at this rate your chart would have to be pretty old before the chart in variation would make any appreciable fraction of a point. The reason for this is because the magnetic poles change their position from year to year, and as easterly variations are decreasing and westerly variations increasing, the magnetic pole is moving westward, or to the right around the true pole.

There are some portions of the world where the variation changes one degree in seven years, or at the rate of about nine minutes per annum; other places only half this amount; others, again, where it is only one minute, and some places where there is no change at all. Where the annual change is zero is where the easterly and westerly variations reach a maximum, or their greatest deflection from the true meridian. In the United States there are two such curves, where the variation is a maximum. One of these curves is in the extreme eastern portion—in the vicinity of Maine, the other along the Pacific coast. In Maine it is a westerly maximum; on the Pacific an easterly maximum. The direction of the curve of easterly maximum is in the direction of WNW, while the maximum easterly curve is in the direction of north and south. It must be understood from this that as the variation of both kinds increases gradually from the line of no variation to its maximum it begins to diminish gradually again and becomes zero on the line of no variation, which is now somewhere on the opposite side of the earth. The following diagram will illustrate this:

Variation—various quantities.

..0°..E..40°..E..0°..W..40°..W..0°..W..40°..W..0° 0°..E..40°..E

The annual change in the variation at Duluth is decreasing at the rate of 2.1′. At the Sault increasing at the rate of 5′ every year; at Milwaukee decreasing 5.4′ annually; Chicago decreasing 4.4′; Detroit increasing 2.3′; Cleveland increasing 2.7′; Erie increasing 3′; Buffalo increasing 4′; Oswego 4′. Wherever the annual change is increasing the variation is westerly; wherever the annual change is decreasing the variation is easterly. Bear this in mind.

The variation at Sault Ste. Marie (the Sault), has increased from 1° westerly in 1880 to 2° 16.5′ westerly in 1895—the average increase being 5.1′. The variation at the present time is 2° 57′ westerly—a quarter of a point.

The variation at Buffalo in 1902 was 6° 8′ westerly, increasing 4′ annually. What is the variation at Buffalo for 1905? Answer 6° 20′. This is explained fully in its proper place.

Where the annual change is increasing the correction is to be added to the variation. Where the annual change is decreasing the correction is to be subtracted from the variation.

Why the variation changes more in some places and less in others is not known. There is no good explanation

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for it. It is known to be so from observation.

AN IMPORTANT FACTOR.

A knowledge of the annual change in the variation is important. The student and navigator should provide themselves with a magnetic chart of the world, which contains all the information of value on this subject. In some portions of the world this change is very rapid, and after a few years this correction becomes quite a consideration. Very few sailors are acquainted with this peculiarity of terrestial magnetism, and, in consequence, many of them give courses which were correct years ago, but are so no longer.

There are parts of the world, also, where a trifling change in the ship's position means a comparatively large change in the amount of variation. These localities are easily recognized on the magnetic chart by the crowding together of the variation curves; and when the ship's track happens to lie across these curves, it is necessary to be more than usually careful with the compass course.

Between Nantucket and Cape Race, an Atlantic greyhound will increase the variation as much as 12° in single day's run.

How the variation is taken into account and correctly applied will be explained under another chapter.

QUESTIONS FOR WHEELSMEN AND WATCHMEN.—NO. 18.

Give all principal shoals and landmarks passed on either hand.

In taking courses to make good the correct magnetic course, you should take the mean of variation between ends of each course.

181. What prominent mark would you have to get a bearing to know when to haul so as to pass to the south'ard of Poe's Reef lightship?

182. When abreast Poe's Reef lightship, how far would you run before hauling to pass clear of Mackinac Point light, and what turning mark would you have and what prominent mark would you head on?

183. If bound from Lake Superior to Chicago late in the season, and going to the north'ard of Bois Blanc island, you found Major Shoal buoy and Graham Shoals buoys removed for the winter, what mark would you head your vessel on when abreast of Round island lighthouse to clear those dangerous shoals?

184. If you had Point Edward ranges direct in line with keel of your boat for at least three minutes and your steering compass reads N½W, what course would you steer to pass about 3 miles off Sand Beach with same compass and vessel in same time?

185. When bound for Lake Superior, what land would you see first after passing Presque Isle, and on which bow if the weather is clear, and what landmark would you be heading on if you were heading right and had not picked up Detour lighthouse?

186. If bound up to Detour passage and weather smoky and you had not located Detour lighthouse, you picked up an island on the starboard bow having three tall trees in the center, what island would this be?

187. How close to the shore do you think deep-laden vessels should approach from Ft. Gratiot to Sand Beach?

188. Why do you range Frying Pan and Pipe island ranges? Could you take a deep-laden vessel in if Pipe island was shut in behind Frying Pan island?

189. How would you navigate a vessel from Detour to abreast of Sweet's Point crib?

190. How would you navigate a boat from abreast Sweet's Point crib to Mud lake turning point beacon?

QUESTIONS FOR MASTERS AND MATES.—NO. 17.

250. Ship heading NNE½E by compass when simultaneous bearings of two objects were taken by the same compass; 1st object bore W by N, and second object bore SSW. Deviation of this compass on NNE is 6° Wly and 8° Wly on NE by N; Var. at place of ship 2½° Ely. What is the true course the ship is making and what are the true bearings of the two objects?

251. What should the bearing of the north star be by a compass having ½ point Wly Var., and no Dev.?

252. A ship making 11½ miles per hour and steering NW, took the bearing of a lighthouse at 9 a. m.; the bearing was W by N; run 22 minutes on course when this same lighthouse bore WSW. How far is the ship from the lighthouse and in which direction?

253. What is the difference in feet between 6,080 feet and the mean length of the nautical mile?

254. Explain the principle of the log-chip, line and sand-glass.

255. How many miles and in which direction is the north magnetic pole from the true pole? What is the direction of the north magnetic pole from the true north pole?

256. What is the first of several corrections to which the compass is subject?

257. Is variation of the compass a "correction" or an "error" of the compass?

258. Is it correct to say that one of the errors of the compass is its variation?

259. Is the variation the same at all places?

260. Is the variation the same at all times at the same place?

261. Does the variation change enough in several years to make any particular difference?

262. Which variation is increasing and which variation is decreasing?

263. In which direction is the line of no variation moving?

264. What is the cause of the annual change in the variation?

QUESTIONS FOR OILERS AND WATER TENDERS.—NO. 13.

131. On what portion of the boiler would you place a hard patch?

132. What precaution must be taken in applying same?

133. What would you do should the patch be required in a position that you could not rivet same on?

134. What effect would the placing of a patch on the fire side of the sheet have?

135. What are the ingredients entering into a boiler maker's cement?

136. What is the object of covering steam boilers, steam pipes, etc.?

137. What kind of covering would you suggest and why?

138. Why do you speak of steam as being invisible gas when one can plainly see it issuing from the exhaust pipe?

139. What is meant by saturated steam?

140. What is meant by superheated steam and what success has the superheater had on the lakes?

QUESTIONS FOR MASTERS AND MATES.—NO. 1.

JULY 19.

1. What is the difference between NNE ½ E and NE by N ½ N?
2. You have corrected your chart course for variation and deviation and you find the compass course to be ENE ¼ E. What course would you give the wheelsman to steer; that is, how would you read the compass to him?
3. For practical purposes how much is 3 degrees equal to in fractional points of the compass?
4. How many three-point courses are there, and what are they.
5. Why is it that the variation of the compass is the same on every point of the compass at the same place, no matter in which direction the ship may be heading, but the deviation is different for different headings of the ship, yet the ship practically remains in the same locality?
6. What is the lubber's point on the compass; what does it represent and what is it used for, and where is it located?
7. How many degrees in 1¼ points?
8. How do you know there are 11¼ degrees in one point of the compass?
9. If your boat made 22 miles in 1 hour and 25 minutes, how fast is she running per hour?
10. How do you know that 11½ statute miles equals 10 knots?
11. You are steering S ¼ W and when you pick up Wind Pt. light you are heading for it; you are ten miles from it and you wish to pass two miles outside of it, what course must you steer in order to do so?
12. Which way do you move on the compass card to go westerly from south; which way would you move to go easterly from south?

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13. A boat steaming at the rate of 11 knots an hour steams how many knots in 7 hours and 30 minutes? How long will it take a boat that steams 11 statute miles per hour to cover the same distance?

14. With the Sault canal ranges over stern your compass reads W ¼ S; how much is the deviation of the compass; what point of the compass is this deviation for, and what course would you have to steer by this compass to cover the course given on the chart between Eagle harbor and Devils island? The true course printed on the chart between these points is WSW ⅞ W.

15. You have steered N by E ¼ E from Chicago to Pt. Betsey, but when you reached the latter place you are 14 miles off the point instead of four miles; how much is your compass out of the way, and which way, easterly or westerly, and what course should you have steered to have made good this course and be off the required four miles?

16. The true bearing through the Sturgeon Bay ship canal is NW ⅛ W, the variation is 2¼ degrees easterly; how should you head going through the canal if your compass was right, that is, free from deviation; supposing that when you went through the canal your compass read NW ¼ N, how much is the deviation and which way is it?

17. You can steer N by E ½ E and make the course good between Chicago and Pt. Betsy; how much deviation has your compass on this course and which way is it?

18. Define true course, correct magnetic course and compass course. Tell which is each and how you get or find them.

19. Starting from east on the compass, where will two points easterly fetch you?

QUESTIONS FOR MASTERS AND MATES.—NO. 3.

AUGUST 2.

1. What two kinds of magnetism are there?
2. Which kind of magnetic poles attract one another?
3. What is repulsion in magnetism? Give an example of it.
4. Why is it that the north end of the compass needle directs itself toward north?
5. What is the north pole of the earth's magnetism and where is it situated?
6. Define the true or geographical north pole of the earth.
7. Where does the direction north begin?
8. Are there places on the earth's surface where the magnetic needle actually points to the true north pole of the earth? Does the needle at the same time point to the north magnetic pole?
9. On which of the great lakes do we have easterly variation, and on which do we have westerly variation?
10. What is the true bearing of the true north pole for an observer stationed at Cleveland? What would be the true bearing of the north magnetic pole for the same observer? What are these two directions called?
11. Why is it that variation is named easterly and westerly?
12. Which way do you allow easterly variation in turning a true course into a correct magnetic course?
13. Which end of the compass needle has the greatest amount of magnetism, the north or south end? Why?
14. What is a 4-point bearing? Give an example and explain its use.
15. In a right-angled triangle what is the longest side called?

QUESTIONS FOR MASTERS AND MATES.—NO. 4.

AUGUST 9, 1906.

55. What is a relative bearing? Explain its use.
56. Which way do you allow easterly variation in converting a correct magnetic course to a true course?
57. The true course is N 38° E, the variation is 5½° westerly and the deviation 11° easterly, what is the compass course?
58. What is the difference between a compass bearing and a correct magnetic bearing?
59. In which direction has the compass card turned with easterly deviation?
60. State a rule for naming the deviation after finding its amount by the difference between the compass bearing and the correct magnetic bearing.
61. If you were to trace on a magnetic chart the line of variation having beside it, say 5° W, at what angle would you be from the true meridian all along this line?
62. What is the magnetic meridian of any place? How would you determine it?
63. You are steering NE by compass when an object on shore bore E by S by the same compass; what is its relative bearing?
64. A compass having natural deviations, that is, a compass that is not adjusted, has one point of easterly deviation with her head correct magnetic north. What would be the reading of this compass with the boat heading correct magnetic north? On south correct magnetic the deviation is of the same amount; but which way will this deviation be and what course by compass would you have to steer in order to make good the course of correct magnetic south?
65. If you took the bearing of a lighthouse by compass and you desired to lay it off from the same lighthouse on the chart, what conversion would you have to make to this compass bearing before it would agree with the chart, and which way would you allow the variation and deviation if you had any?
66. What is the latitude and longitude of Poe's reef lightship as shown on the chart?
67. Two boats start from the same point, one steers N by E 100 statute miles, and the other N by E 100 nautical miles. At the end of each course how far will each boat be (in its own miles) from the meridian on which they started.
68. What should a log indicating nautical miles indicate on the course between Chicago and Pt. Betsy?
69. Why is it that a compass bearing of an object will not agree when you lay this same bearing on the chart from the same object?

QUESTIONS FOR MASTERS AND MATES.—NO. 5.

AUGUST 16.

70. Where is the equator of a magnet?
71. Where is the greatest amount of magnetism of a magnet? Where is the least amount?
72. Is there as much magnetism in one end of a magnet as there is in the other end of the same magnet?
73. What is meant by blue polarity and red polarity?
74. What is the difference between red polarity and south magnetism?
75. What is the difference between south magnetism and blue polarity?
76. What is the neutral line of all magnetic bodies?
77. Why is it that iron filings cling to the ends of a magnet and not to its middle portion?
78. What are the lines of force of any magnet?
79. What is meant by the magnetic field of a magnet?
80. What magnetic lines conceived to be drawn on the earth represent the magnetic field of the earth's magnetism?
81. What is a magnetic needle?
82. What is meant by magnetic dip? Where is it greatest and where is it least?
83. Why do iron filings cling to both ends of a magnet alike?
84. What would be the result were you to present the north pole of a bar magnet to the north pole of a movable magnetic needle?
85. What is a natural magnet?

QUESTIONS FOR MASTERS AND MATES.—NO. 8.

SEPTEMBER 16.

116. If the sun's azimuth (bearing) is N 115° 15′ E at 8:10 A. M. for a given date and place, what will its bearing be at 3:50 P. M. of the same date?
117. What is the "opposite" time of 7:50 A. M. on the face of a clock?
118. If the sun bears E by S at rising for a given date and place, what will its bearing be at setting for the same date and place?
119. What is the length of a degree of longitude on the equator?
120. What is the length of a degree of longitude on the parallel of 60 degrees north or south?
121. When the sun's declination is south, does the sun rise and set bearing north or south of the east and west points, for an observer on the lakes?
122. How many minutes of arc in 0.6 of a degree?
123. Two boats start from the same point, one steers N by E 100 statute miles, and the other N by E 100 nautical miles. At the end of each course how far will each boat be (in its own miles) in a direct east and west line from the meridian on which they started?
124. What is meant by the lead or pitch of a propeller wheel?
125. How many pounds in a gross ton, or long ton?
126. How many pounds in a net ton, or short ton?
127. How many cubic feet in a marine ton, such as in figuring the tonnage of a vessel?
128. How many cubic feet in a ton of hard coal?
129. Why is it that a vessel carries more tons than her cargo space calls for, or either her net or gross tonnage?
130. What is a safety curve on a chart? What is it used for?

QUESTIONS FOR MASTERS AND MATES.—NO. 10.

SEPTEMBER 20.

146. What is meant by the portative force of a magnet?
147. Two magnets of equal size, such as two adjusting magnets, how could you put them together so as to destroy or neutralize their magnetism?
148. What is an isogonic line?
149. What is the difference between an isogonic line and a line of equal variation?
150. What is an agonic line?
151. Is there an agonic line passing through the lake region?
152. How does a compass point on this agonic line?
153. Does a magnet lose any of its force by being incased in brass or copper, such as adjusting magnets?
154. What effect has a brass or copper casing as to the portative force of a magnet?
155. What is meant by attraction across bodies?
156. Will attraction assert itself through wood, brass, glass, etc.?
157. Is it possible to intercept magnetism by placing wood, brass and like substances between the compass and the iron or steel creating the disturbing force?
158. Does a magnet covered with wood have the same amount of magnetic force it would were it not covered with wood?
159. What are magnetic charts?

QUESTIONS FOR WHEELSMEN AND WATCHMEN.—NO. 2.

JULY 19.

Give all shoals and principal landmarks passed on either hand.

In taking courses to make good the magnetic course, you should take mean variation from point of departure to point of destination.

16. Give course and distance from Oswego to Cape Vincent.
17. Give course and distance from Oswego to Nine Mile Point.
18. How should you navigate a boat from Nine Mile Point to Kingston?
19. Give course and distance from Oswego to Sackett's Harbor.
20. Give course and distance from Oswego to Big Sodus.
21. Give course and distance from a point 2 miles N Big Sodus to Cape Vincent.
22. Give course and distance from a point 3 miles NE of Genesee Lt. to Nine Mile Pt.
23. Give course and distance from a point 4 miles N Port Dalhousie Lt. to Oswego.
24. Give course and distance from a point 4 miles N Port Dalhousie Lt. to a point 4 miles S of False Ducks Lt.
25. Give course and distance from a point 4 miles S of False Ducks Lt. to Cape Vincent.
26. Give course and distance from a point 4 miles S of False Ducks Lt. to Nine Mile Pt.
27. Give course and distance from a point 4 miles N of Pt. Dalhousie Lt. to Toronto Range Lts. easterly entrance.
28. Give course and distance from a point 4 miles N of Pt. Dalhousie Lt. to a point 1 mile S of Pt. Oshawa Lt.
29. Steamer having stern on Mamjuda Ranges, compass heading N 6° E; what would be the correct compass course of this steamer from Oswego to Nine Mile Pt. with same compass and same trim?
30. Steamer having stern on Mamjuda Ranges, compass heading N 9° E, what would be the correct compass course of this steamer from Fairhaven to a point 4½ miles E of False Ducks Lt. with same compass and same trim?
31. Give mean variation from Pt. Dalhousie to False Ducks Lt.

QUESTIONS FOR WHEELSMEN AND WATCHMEN.—NO. 4.

AUGUST 2.

Give all shoals and principal landmarks passed on either hand.

Note.—In all cases where the course is not printed on the chart take it off according to directions, and give both its true and mean correct magnetic directions. When the course is printed merely give its (mean) correct magnetic direction, as already explained.

42. Give course and distance from Conneaut to Bar Pt. via north passage.
43. Give course and distance from Ashtabula to Bar Pt. via north passage.
44. Give course and distance from Erie to two miles NW Cleveland breakwater light.
45. Give course and distance from Con-

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neaut to two miles NW Cleveland breakwater light.
46. Give course and distance from Ashtabula to two miles NW Cleveland breakwater light.
47. Give course and distance from two miles NW Cleveland breakwater light to entrance buoy Sandusky channel.
48. How would you navigate a ship from Sandusky entrance buoy to B. & O. R. R. dock?
49. Give course and distance from two miles NW Cleveland breakwater light to entrance Toledo straight channel light via south passage.
50. How would you navigate a ship from Toledo straight channel light to Hocking Valley R. R. coal dock?
51. Give course and distance from two miles NW Cleveland breakwater light to Bar Pt. via south passage.

QUESTIONS FOR WHEELSMEN AND WATCHMEN.—NO. 5.

AUGUST 9.

Give all shoals and principal landmarks passed on either hand.
In taking courses to make good the correct magnetic course, you should apply to the true course the mean variation from point of departure to destination.
52. Give correct magnetic course and distance from two miles NW Cleveland breakwater light to Bar Pt. via north passage.
53. Give correct magnetic course and distance from two miles NW Cleveland breakwater light to Bar Pt. via middle passage.
54. Give correct magnetic course and distance from Toledo straight channel light to Bar Pt.
55. When leaving Buffalo what marks have you to guide you that you can clear Waverly shoal?
56. When going to Buffalo what marks have you to steer on?
57. What marks have you to know when to haul for north breakwater entrance?
58. How do you enter Erie harbor?
59. How is the Erie harbor channel marked inside?
60. What is the true range of Conneaut harbor?
61. What is the correct magnetic range of Ashtabula harbor?

QUESTIONS FOR WHEELSMEN AND WATCHMEN.—NO. 6.

AUGUST 16.

Give all shoals and principal landmarks passed on either hand.
62. What is the true range of Ashtabula harbor?
63. What is the correct magnetic range of Fairport harbor?
64. How would you enter Cleveland harbor?
65. What dangers are to be avoided entering Cleveland harbor main entrance?
66. Going through south passage coming from eastward with South Bass island in view and Green island shut in to the northward of South Bass island, what would you do?
67. How does Waverly shoal bear from Buffalo breakwater light north entrance?
68. How does Seneca shoal gas buoy bear from light on south entrance Buffalo breakwater?
69. How does South Bass island light bear from Kelleys island south shoal gas buoy?
70. How does Starve island reef gas buoy bear from Green island lighthouse?
71. How does Mouse island can buoy bear from South Bass island light?

QUESTIONS FOR WHEELSMEN AND WATCHMEN.—NO. 9.

SEPTEMBER 6.

Give all shoals and principal landmarks passed on either hand.
92. Steering on South channel, Grosse island ranges on a dark night with North channel, Grosse island ranges not visible and can't locate red stake at lower end of Fighting island, what turning mark have you so you can bring stern of boat on or nearly on North Grosse island channel ranges?
93. Tell how to navigate a steamer from red stake at lower end of Fighting island to head of Belle island.
94. What good mark is there to bring stern of boat on from Sandwich Point to abreast Woodward avenue, Detroit?
95. What mark would you have stern of boat on and what mark would you head on from lower end to upper end of Belle island?
96. Explain how to navigate a boat from head of Belle island to entrance to St. Clair ship canal.
97. When bound up Detroit river steering on Windmill Point ranges, what turning mark have you when hauling for entrance to Grosse Point cut? What would you head your vessel on, and what landmark would you have stern of boat on?
98. How is Grosse Point 29-ft. channel marked?
99. What is the distance from lower end of Grosse Point cut to lightship?
100. What is the width of Grosse Point cut channel?
101. Tell how to navigate a boat from St. Clair cut to Canadian club house.

QUESTIONS FOR WHEELSMEN AND WATCHMEN.—NO. 11.

SEPTEMBER 20.

112. What ranges would you run on going from Southeast bend to Star island house?
113. After leaving lower end of Grosse Pt. channel what marks would you head on and what mark would you have the stern of boat on?
114. What mark would you have to make a slow turn to have stern of boat on Windmill Point ranges?
115. When desiring to round to bound down at Detroit at night and can't see spar buoy at lower end of Belle Isle, what marks have you to know when you are abreast of it?
116. As it is often smoky passing down from Belle Isle to Sandwich Pt., tell us if you have any mark to head on and what it is?
117. When abreast Smith's coal dock what ranges would you use and which way would you keep them open?
118. Name in proper order what ranges you head on and what ranges you put stern of steamer on from Smith's coal dock to lower end of Bois Blanc island.
119. When wanting to know when to starboard slowly so as to bring stern of steamer on South Grosse Isle channel ranges, tell if you have any mark and what it is?
120. Which way will the current carry you from South Grosse Isle channel ranges to upper end of Ballard's reef channel?
121. If bound down what whistle side would you take of a steamer bound up?

QUESTIONS FOR OILERS AND WATERTENDERS.—NO. 1.

AUGUST 9.

1. What would you consider your first duty on entering an engine room?
2. What would you consider the most essential duty in the care of the dynamo?
3. State three qualifications required by an oiler.
4. State three qualifications required by a watertender.
5. If you heard a pounding in the air pump, what would you consider the cause?
6. State a safe remedy.
7. Why does one boiler of a battery require more feed water than another at times?
8. What effect would the opening of the soot-box door have on a tubular boiler, fires being in the same shape as the other boilers?
9. In case the water in the boiler should fall so low you could not ascertain its height by simply glancing at the water glass, what could you do to tell whether it had fallen below the safety limit or not?
10. Why is the L. P. cylinder of a compound engine larger than the H. P.?

QUESTIONS FOR OILERS AND WATERTENDERS.—NO. 2.

AUGUST 16.

11. Why do high-speed engines have a short stroke compared with the diameter?
12. Name a disadvantage.
13. Name an advantage.
14. What is an overhanging crank?
15. What is meant by the terms "lead" and "throw" of an eccentric?
16. Have we any engines where the eccentric follows the crank, if so, name the kind of valve used.
17. What would cause a fusible plug to blow if water level was at its proper height?
18. Name three important duties in the care of a tubular boiler.
19. Would you close the steam valve to a high-speed engine if you thought water was coming back through the exhaust line?
20. What would you do if the water in the boiler raised high enough to flow over into the auxiliary machinery.

QUESTIONS FOR OILERS AND WATERTENDERS.—NO. 5.

SEPTEMBER 6.

41. Does the vacuum gauge enable you to tell what pressure there is in the condenser?
42. If a vacuum in a pump was 28 in., how high up a pipe would the water rise if the vacuum in condenser is 24 in?
43. Through what valves, pipes and chambers does the steam pass from the boilers until it is in the form of water in the hot well?
44. With a condensing engine, what valves are on the skin of the ship, in the engine room and in the fire hold?
45. What is a sluice valve? What attention would you give them?
46. Explain the action of a steam lubricator. What will take place should you apply cold applications to the outside?
47. Why is soda sometimes put into a boiler? What kind is generally used?
48. When the engines are stopped with steam up, what are to be shut and what are to be opened.
49. What precaution should be taken in using a bilge injection?
50. What evil effects are produced by scale, of what does it consist, in what part of a tubular and Scotch boiler does it collect most?

QUESTIONS FOR OILERS AND WATERTENDERS.—NO. 7.

SEPTEMBER 20.

61. What temperature should you carry the feed water in a jet condenser?
62. Why is not a greater vacuum than 25 or 26 inches carried?
63. If you found your discharge pipe from air pump vibrating, or your pump thumping, what would you do?
64. How would you find the length of the eccentric rod with link motion?
65. Give the thickness of the various plates used in boiler manufacturing, shell plates being one (1) inch thick.
66. If you had (2) two boilers of the same diameter, what would their relative pressures depend upon?
67. If one boiler was 12 ft. in diameter, and the other 4 ft., which would stand the greatest pressure, and how much?
68. If the glass water gauge is fitted on a mounting connected by two pipes, one to the dome and one to water space, what would you do on observing (1st) that the glass was empty, and (2nd) that the glass was full?
69. What is one of the most important duties of an engineer or oiler O. B. ship?
70. In assisting to set a valve you had 1/8 in. top lead and 5/8 in. on the bottom, you wanted 5-16 in. on top and 9-16 in. on the bottom, what would you do.

MISCELLANEOUS ITEMS.

Fire broke out on the whaleback barge Henry Cort while lying at the Central Blast Furnace dock at Cleveland Tuesday night. About $5,000 damage was done.

The steamer Yale, owned by John J. Boland, has been chartered by the Mutual Transit line to trade in package freight the balance of the season. Martin Peterson sails her.

It now appears that the steamer Fayette Brown's collision with a barge at the Sault was caused by a steel corporation barge steering into her and knocking her over against another.

One of the busiest postoffices on the lakes is located at Ashtabula harbor. The amount of money sent to different parts of the United States and the world through the office is greater than in many big cities. Clint H. Watrous is superintendent of the office.

Frank Stevens, who was formerly a mate on the lakes, returned to Buffalo from the Klondike a short time ago, and he is now entertaining his old shipmates with tales from that Eldorado. Mr. Stevens was in the Klondike nine years, where he has located several gold claims.

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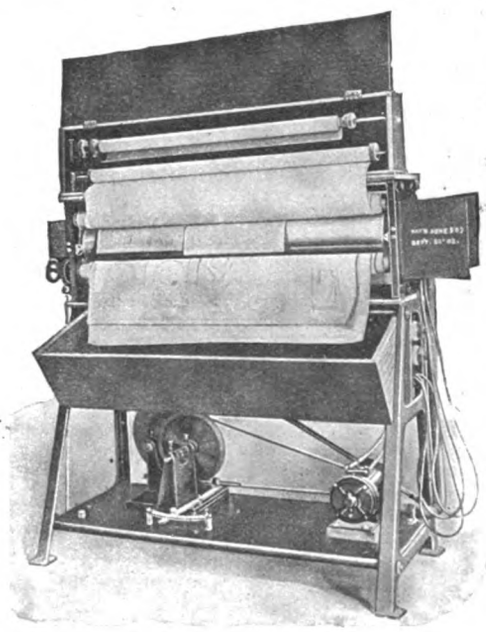
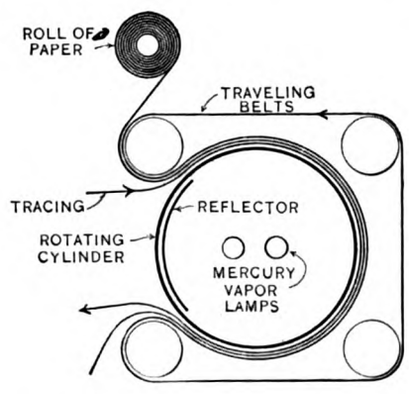
BLUE PRINTING MACHINE.

We are indebted to the Revolute Machine Co. for the accompanying cut of the Everett-McAdam continuous electric blue printing machine and for the following description taken from a unique printed circular issued by them.

"The machine consists of a rotating glass cylinder which lies in a series of narrow belts, and within which cylinder are placed two mercury vapor electric lamps. The roll of paper to be printed is placed in a box on top of the machine and feeds in continuously between the belts and the cylinder; or, if only a few prints are wanted, previously cut sheets of paper may be fed in. The tracings are inserted between the paper and the cylinder, and,





after passing around three-fourths the circumference of the cylinder, are deposited with the paper in a box in the front part of the machine, the printing being done from the inside of the cylinder as the paper and tracings travel around it."

This machine successfully solves the problem of continuous blue printing by electric light and has many points of very decided advantage and is the nearest thing to perpetual motion that has been brought to our attention.

It is possible to make prints five feet wide and of any length whatever, and the device is particularly adapted to making numbers of small prints on one long sheet of paper or on previously cut sheets—which come out in a regular stream—and of an absolutely uniform tone.

One great feature of this continuous machine is that it is only necessary to handle one tracing at a time, the small ones being fed in side by side, while the paper feeds in automatically from a continuous roll.

The tracings go in and come out on the same side of the machine so that the leading edge of a tracing may be started into the machine again before the trailing edge comes out, saving considerable time where more than one print is wanted from one tracing. This was very nicely illustrated by making twelve prints from one six foot tracing on a single sheet of paper seventy-two feet long without wasting an inch of paper or a second of time between prints.

One unique feature of the Everett-McAdam machine is the use of a number of one and a half inch belts instead of a single broad one. In this way absolutely perfect contact is obtained which it is not possible to obtain with the use of a single broad belt.

The lamps used are particularly adapted to this kind of work as they give out only chemical rays—no energy being lost in non-chemical light, and as the printing is done from the inside of the cylinder, the light strikes the paper at right angles and the machine has an absolutely maximum electrical efficiency, the power required to run it being less than any other machine.

The machine is very compact, requiring a space only two feet by five feet and is entirely self-contained. It is driven by a motor and the speed can be instantly changed to any rate desired by moving a convenient lever.

Although the machine has been on the market only a year, there are forty already in daily use, proving the claims made for them by the inventors. The demand for the machines made it necessary to incorporate and start a shop for building them exclusively, and this resulted in the organization of the Revolute Machine Co., of 523 West 45th street, New York.

TRADE NOTES.

The Fore River Ship Building Co., Quincy, Mass., has recently issued a little booklet containing views of its plant and some of the steamers built by it, including the Creole, of the Morgan line, which vessel, as is known, is equipped with Curtis marine turbines.

The Atlantic Works, Inc., 28th St. and Gray's Ferry Road, Philadelphia, Pa., has received an order from Messrs. James Shewan & Sons, foot of East Houston St., New York, for one of their B-17 adjustable bevel band saw machines with lower traveling guide, and also for an S-4-40 in. rip-saw bench, these two machines being duplicates of orders given about a year ago by the same company.

The Buckeye Engine Co., Salem, O., has just put out an attractive catalog descriptive of the Buckeye electric blue printing machines. The catalog contains a complete description of the machine with many beautiful illustrations, together with price list and the names of about a hundred firms that use it. As the manufacture of these machines is but a small part of the company's gas and steam engine business, they are sold to the trade at prices which represent but a reasonable margin of profit. Anyone interested in these machines would do well to write for the catalog.

The carrying power of the British mercantile marine was increased on Sept. 20 in the following proportions, simply by the addition to it of the Mauretania and Adriatic. Here is the sum: Mauretania, gross register, 33,200 tons; speed, 25 knots; equals 83,000 tons of 10-knot steam tonnage, or 249,000 tons of sail tonnage, on the recognized basis of 3 tons of sail equals one ton of 10-knot steam. Adriatic, gross register, 25,000 tons, at 19 knots, similarly equals 47,500 of 10-knot steam, and 142,500 of sail tonnage. Thus the two equal in themselves an enormous fleet. The day marked high water in the history of British ship building.

The annual report of Webb's Academy and Home for Ship Builders at Fordham Heights in the Bronx borough, New York City, shows the institution to be in excellent financial condition. The balance as of April 1, 1905, was $64,610.97. The receipts from all sources during the year were $101,153.07; disbursements during the year were $58,460.11 leaving a balance of $107,303.93 in the treasury.

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THE MARINE REVIEW

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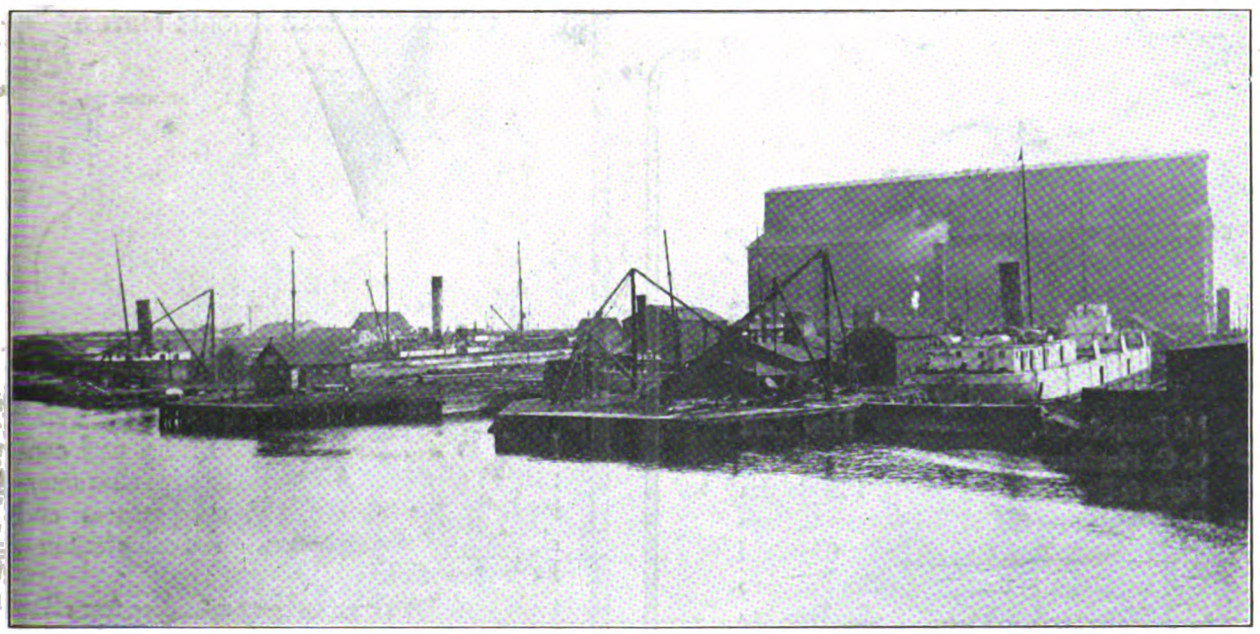

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¶ Our plant having been thoroughly reorganized both as to management and equipment, we are enabled to do all kinds of ship repairs at reasonable cost to the owners, whose patronage is solicited with the guarantee of satisfaction in all particulars.

¶ We call attention to our facilities for the construction of new vessels of all kinds, particularly dredging outfits, tugs, scows, fuel lighters, etc., plans for which we will furnish on application together with specifications and estimates of cost.

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Buffalo, New York

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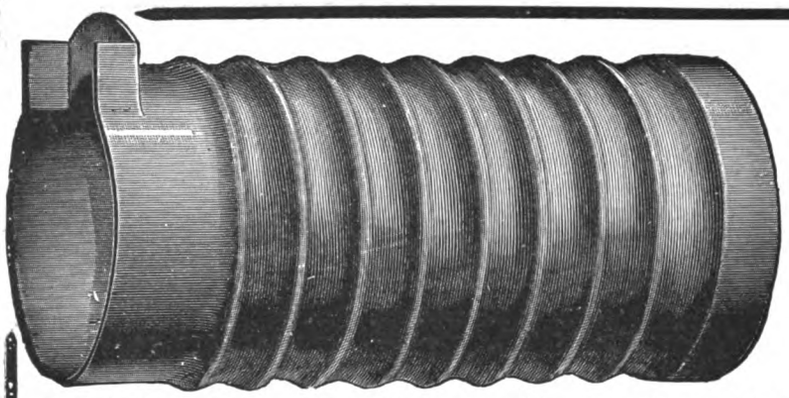

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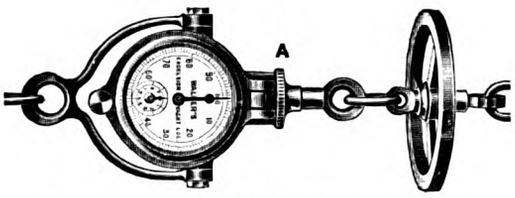

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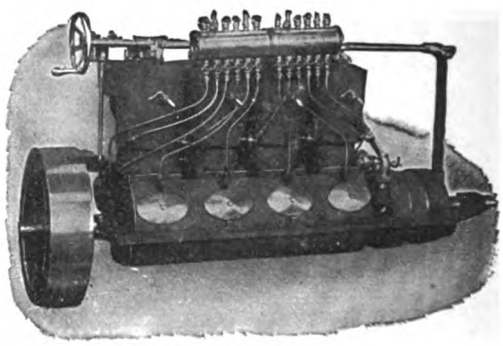

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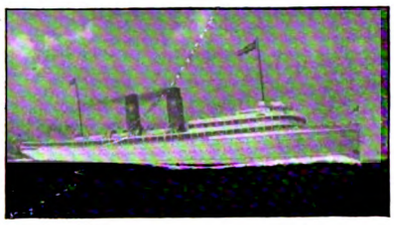

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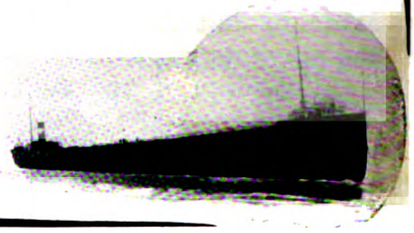

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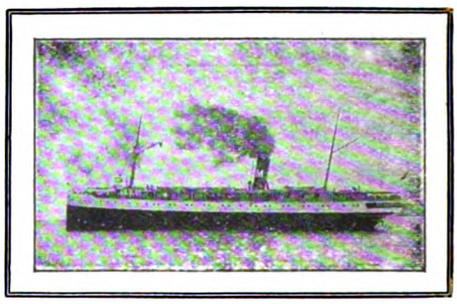

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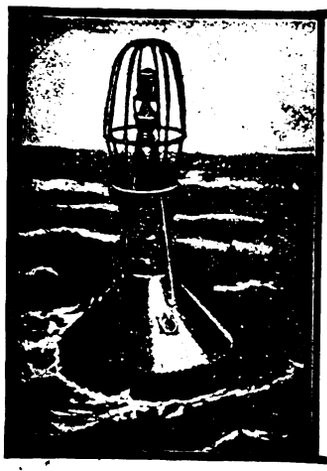

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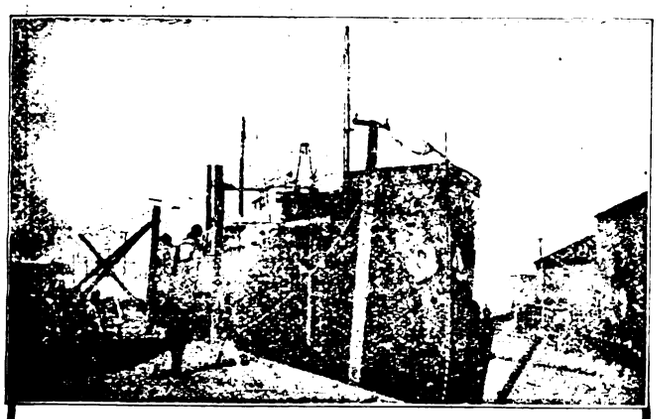

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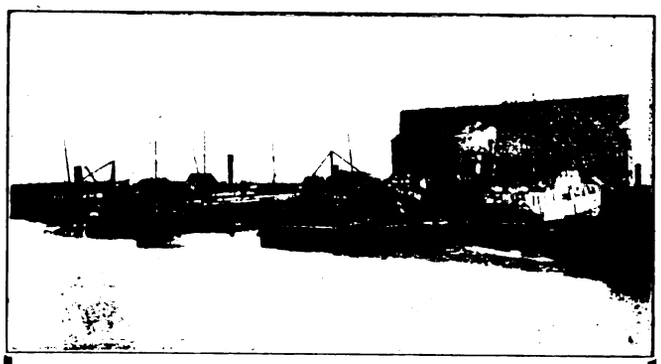

Announcement

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We call attention to our facilities for the construction of new vessels of all kinds, particularly dredging outfits, tugs, scows, fuel lighters, etc., plans for which we will furnish on application together with specifications and estimates of cost.

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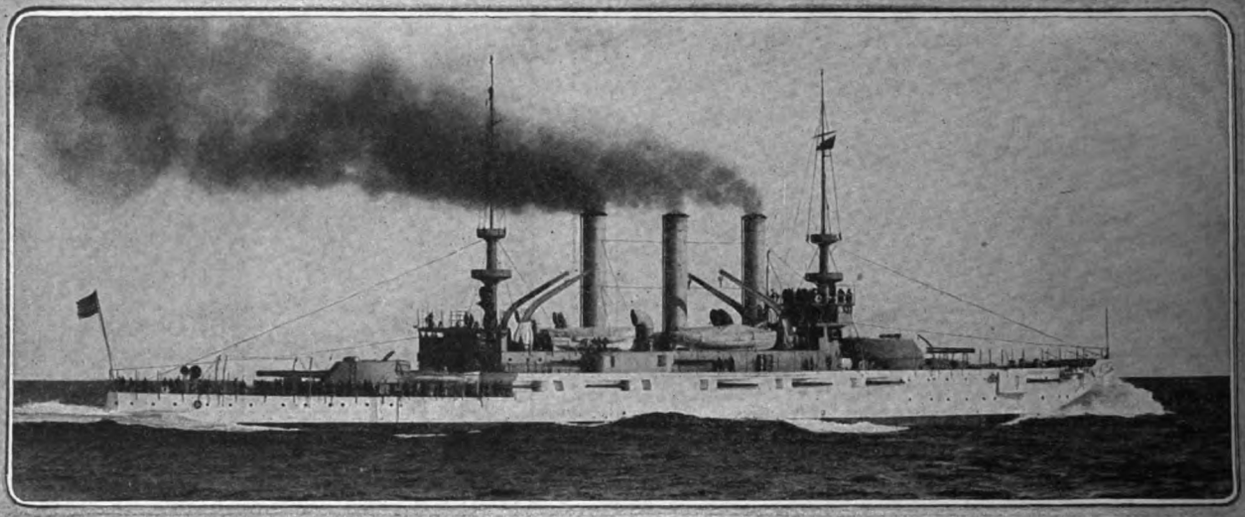

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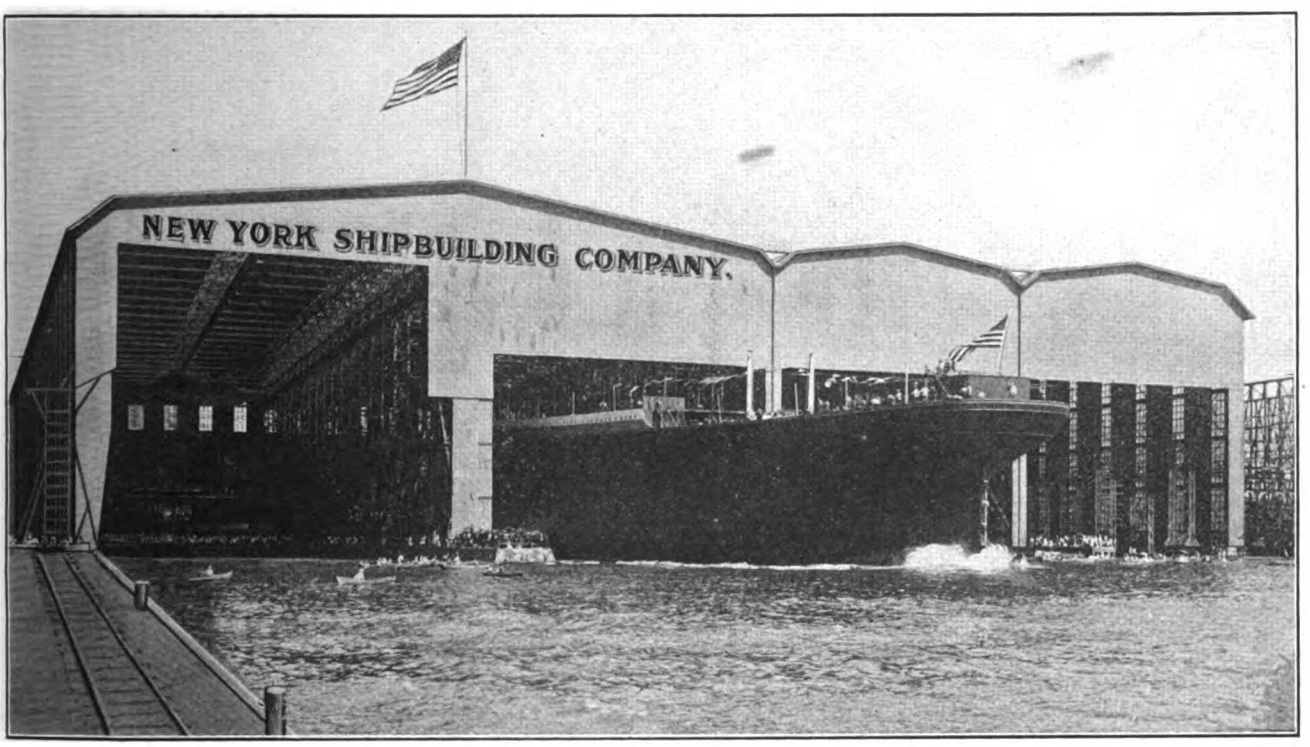

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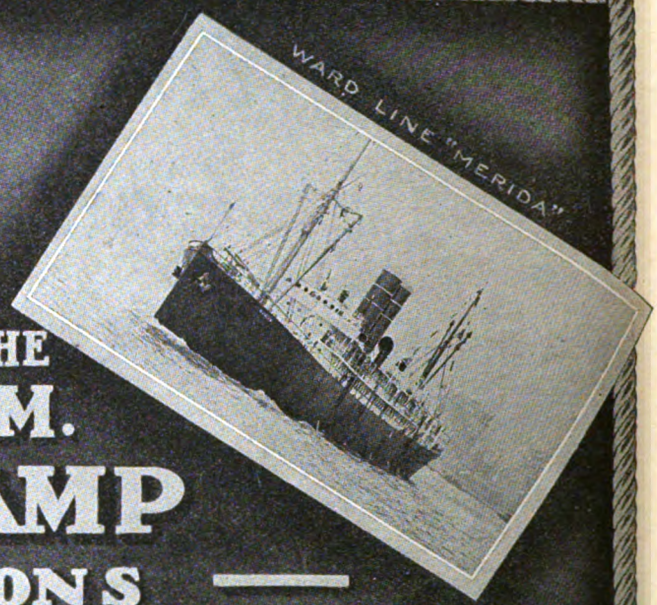

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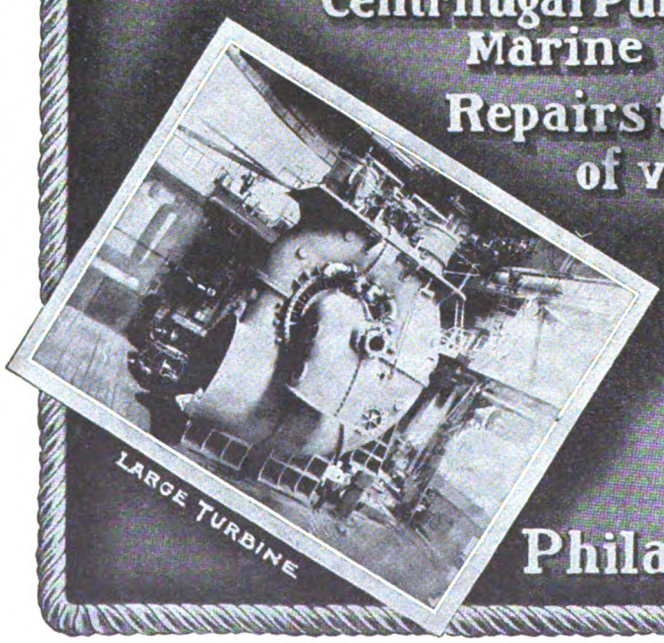

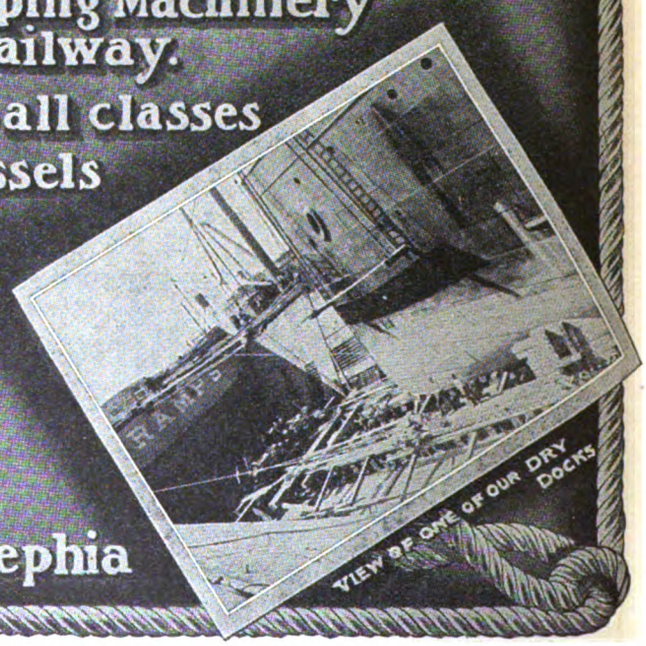

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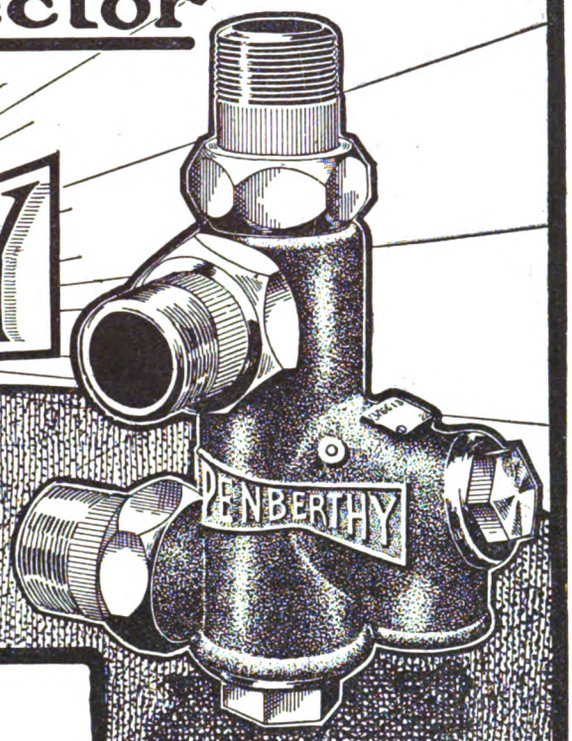

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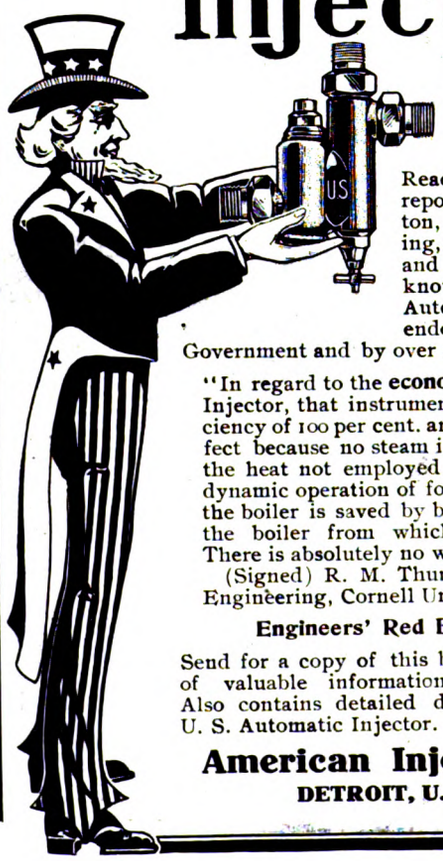

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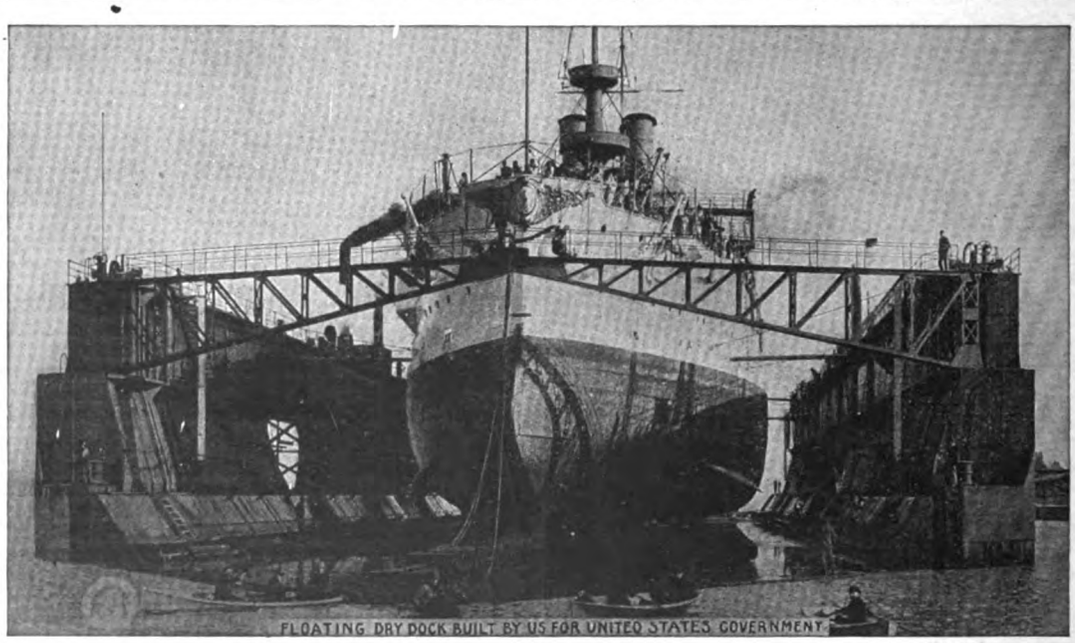

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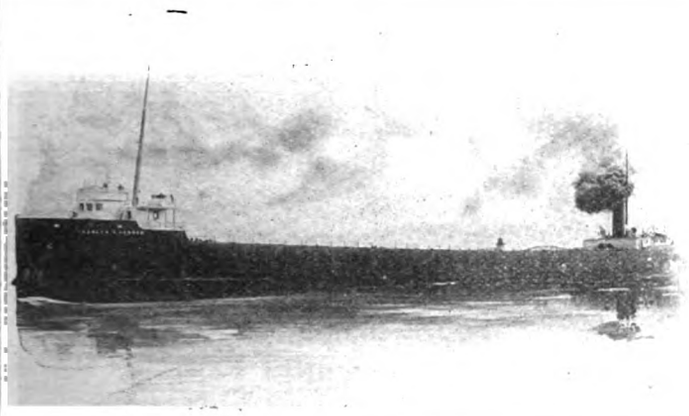

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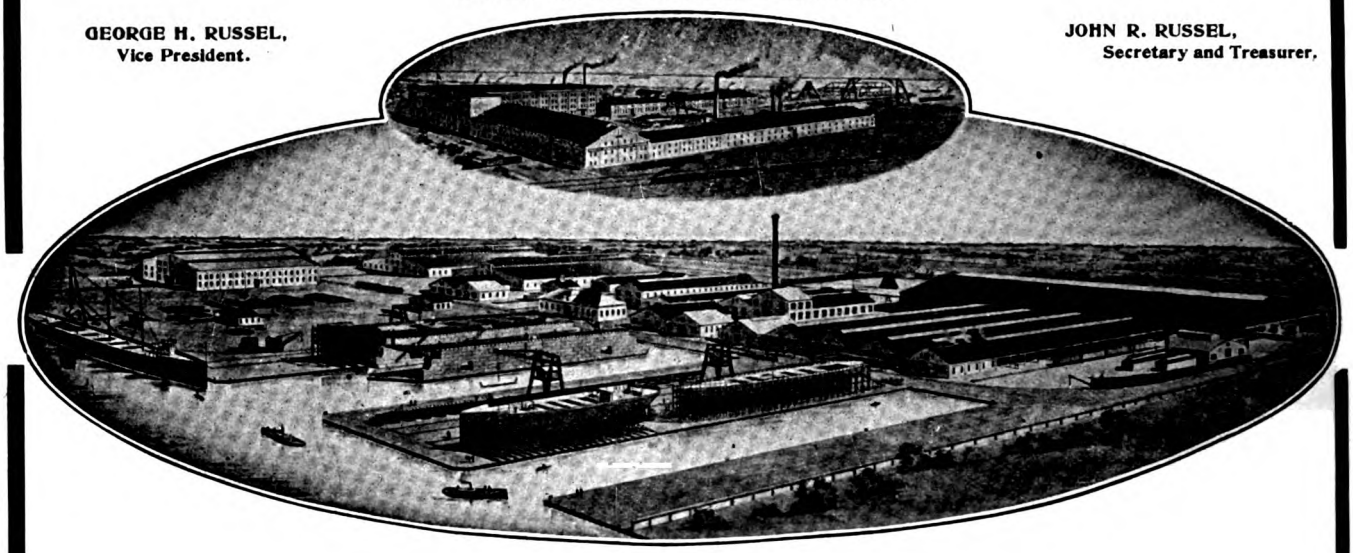
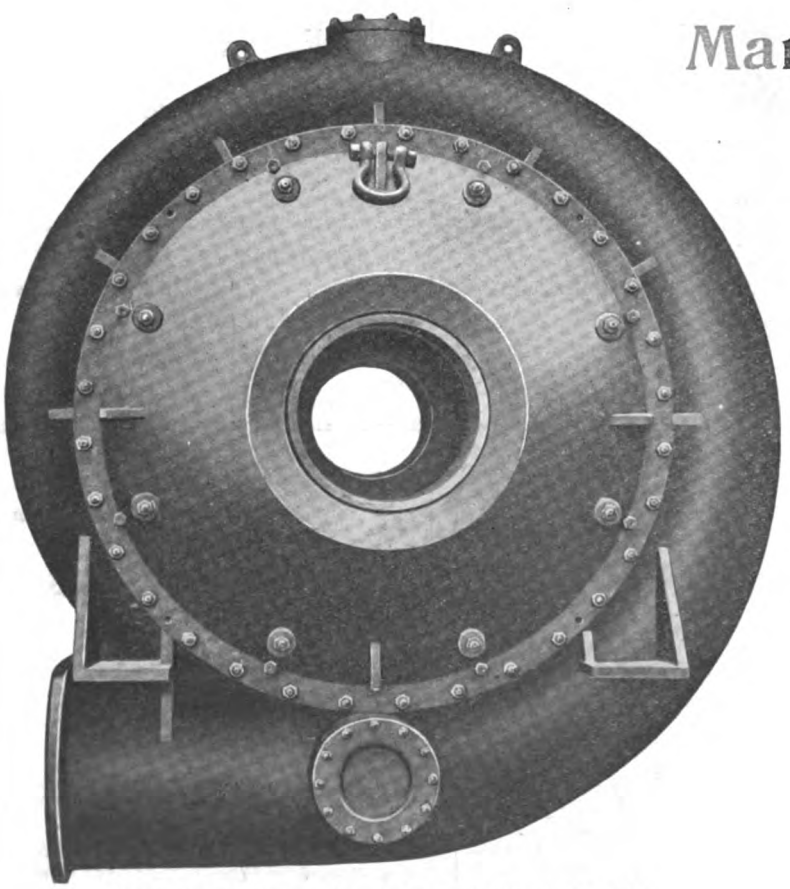


Steel Ship Builders

Floating Dock

Marine Engines



Centrifugal Pumps for Hydraulic Dredging, etc.

Marine Repairs

Hydraulic Dredges

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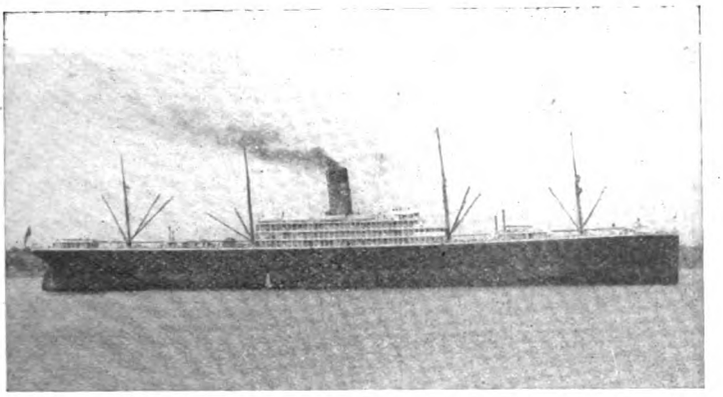
Hyde Windlasses and Capstans



Steamship Minnesota equipped with Hyde Windlass and Capstans.

Selected for the Minnesota and Dakota of the Great Northern Steamship Co.'s fleet—the largest vessels ever built in the United States. They are also being installed on nearly all of the vessels now building for the Navy Department, Revenue Cutter service, Lighthouse Board and the United States Coast Survey.

Reason—Their Superiority.

Send for Illustrated Catalog.

HYDE WINDLASS COMPANY

BATH, MAINE

Geo. L. McCurdy

169 Jackson Boulevard

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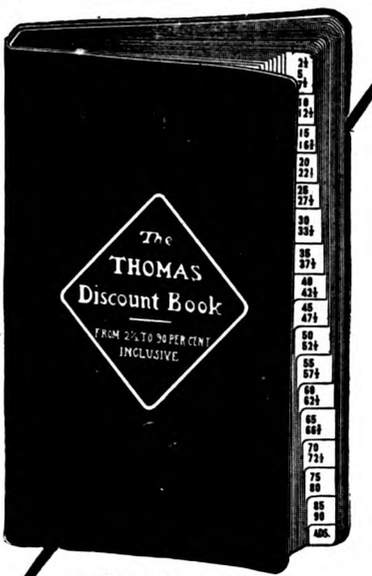
HULLS and CARGOES

DIRECT REPPESENTATIVE OF LEADING AMERICAN AND FOREIGN UNDERWRITERS



Edited and compiled by MILLARD T. THOMAS.

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CLEVELAND

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Buying, Selling, Chartering BOATS.

If you desire to charter, sell or buy let us help you.

CHICAGO STEAMER EXCHANGE,

No. 144 So. Water Street,
Long Distance Phone Cent. 5046. **CHICAGO.**

WANTED.

WANTED.—One of Capt. Fields' Double-Dial Sun Compasses, second-hand. State price. Address MARINE REVIEW.

WANTED.—Tug; draft not over 3 ft. 6 in.; 30 to 40 H. P.; in good order, Sandusky Portland Cement Co., Sandusky, Ohio.

FOR SALE.

VERTICAL ENGINE.

One triple-expansion marine type vertical engine, 11¼-inch, 18-inch, 29 x 18-inch stroke. Inquire, Public Lighting Commission, No. 40 Atwater Street East, Detroit, Mich.

FOR SALE.—One McMyler Derrick. Good as new, with 1¼ yd. Clam Shell Bucket. Located at Cleveland, Ohio. Graves & Stephens, Cleveland, Ohio.

For Sale.

1,000 h. p. fore and aft Neafie & Levy compound Engine; surface condenser; independent pumps.

Two 12-foot Scotch Boilers.
One 13½-foot Scotch Boiler.
One 10 16-25 x 16 triple expansion Engine.

Three 150-h. p. Almy Boilers.
One 200-h. p. Tregurtha Boiler.
One 14 30 x 24 fore and aft Engine and condenser.

One Williamson steering Engine.
One 10 k. w. electric lighting Set.
One 15 k. w. electric lighting Set.
One Providence Windlass, 50 fathoms 1½ in. chain.

Two thrust Shafts and Bearings, 8½ in. diameter.

MARVIN BRIGGS,
17 Battery place, New York, N. Y.

Steamer for Sale Cheap.

The lighthouse steamer Haze, 145 ft. long, 27-ft. beam, 9-ft. draught, 500 tons capacity, 300 horsepower engine and boiler, suitable for passenger or freight business, fully equipped. Steam capstan, donkey boiler. Jacob Ullman, 46 Lloyd street, Buffalo, N. Y.

STEAMER ARGO.

FOR SALE.—The controlling interest (23,061-30,000) of the Passenger and Freight Steamer ARGO as she now lies at the Manitowoc Dry Dock Co.'s wharf at Manitowoc, Wisconsin.

The steamer ARGO is 740 tons net; built of steel; has two decks and is 173.5 ft. long, 31.6 ft. breadth and 20.8 ft. depth. The steamer will be sold to the highest bidder and a certified check for 10 per cent of the amount bid must accompany each tender to secure consideration, the balance to be payable in cash upon delivery of Bill of Sale.

All bids should be addressed to R. Parry-Jones, Esq., Perry-Payne building, Cleveland, Ohio, and will be opened by him in the presence of attending bidders at noon November 15, 1906. No bid based on less than $30,000 for the whole boat will be considered.

The right is reserved to reject any and all bids.

Boilers for Sale.

Five Scotch Boilers, allowed 160 lbs, steam. Good as new. ERIE MACHINERY CO., 729 Garfield Bldg, Cleveland, O.

GOULD'S NAUTICAL SCHOOL,
265 MARCY AVE., CLEVELAND, O.
Established 1894.

Full and complete instructions in Lake and Ocean Navigation; also the Laws of Magnetism as applied to the compass, its effects, adjustments, etc. Will open about Dec. 10th.

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PLANS AND SPECIFICATIONS FURNISHED.

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BUFFALO, 914 The Fidelity Bldg.
CLEVELAND, 1006-1008 Rockefeller Bldg.
CHICAGO, 1114-15 Royal Insurance Bldg.

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We Represent Only the Assured

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Atlantic Building, 51 Wall Street, New York

Insures against marine and inland transportation risk and will issue policies making loss payable in Europe and Oriental countries.

Chartered by the State of New York in 1842, was preceded by a stock company of a similar name. The latter company was liquidated and part of its capital, to the extent of $100,000, was used, with consent of the stockholders, by the Atlantic Mutual Insurance Company and repaid, with a bonus and interest, at the expiration of two years.

During its existence the company has insured property to the value of	$21,108,343,494.00
Received premiums thereon to the extent of	224,197,211.06
Paid losses during that period	127,760,071.08
Issued certificates of profits to dealers	81,310,840.00
Of which there have been redeemed	73,744,440.00
Leaving outstanding at present time	7,566,400.00
Interest paid on certificates amounts to	19,469,981.85
On Dec. 31, 1905, the assets of the company amounted to	12,716,427.62

The profits of the company revert to the assured and are divided annually upon the premiums terminated during the year, thereby reducing the cost of insurance.

For such dividends, certificates are issued subject to dividends of interest until ordered to be redeemed, in accordance with the charter.

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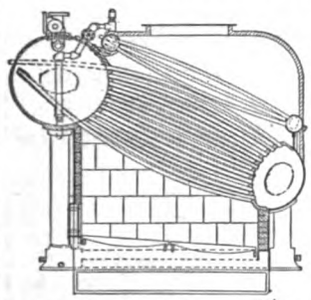
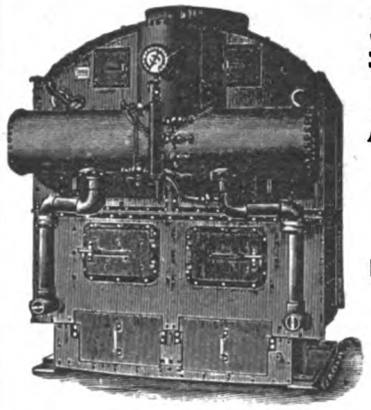
THE MOSHER PATENT WATERTUBE BOILER



Simplest, lightest most compact boiler made. Most accessible for cleaning and repair. Five vertical rows or as many as 45 tubes may be cleaned or withdrawn by removing the cover from a single hand hole. Largest grate surface on a given floor space. No joints in the fire. All joints expanded. Greater steam room and water capacity than any other boiler. Built in sizes up to 2000 H. P. Mosher Boilers have been supplied for eleven torpedo boats and the monitor Florida of the U. S. Navy, amounting to over 26,000 H. P., six torpedo boats for the Russian Navy two gun boats for the Mexican government, one cruiser and one torpedo boat for the Brazilian government; the steam yachts Arrow, Elide, Feiseen, Wauneta, Presto, and numerous other yachts and vessels.

SEND FOR DESCRIPTIVE CATALOGUE.

MOSHER WATERTUBE BOILER CO., No. 1 Broadway, N. Y.



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Now Equipped With

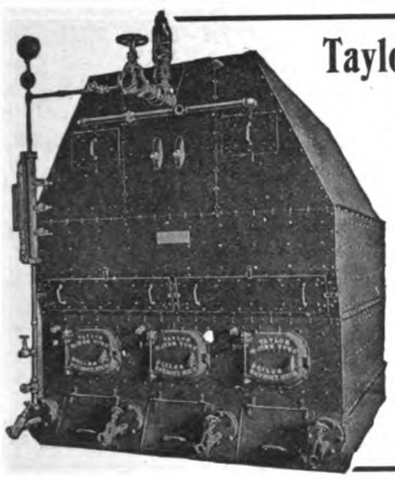
ALMY'S PATENT SECTIONAL Water Tube Boilers

Bear Evidence of Their

Excellent Qualities

ALMY WATER-TUBE BOILER CO

PROVIDENCE, R. I.



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Vertical Tubes, sectional, large steam space and liberating area.
Fire box, combustion chamber, and course for the furnace gases similar to the Scotch Marine.
Free circulation type.

Send for full description.

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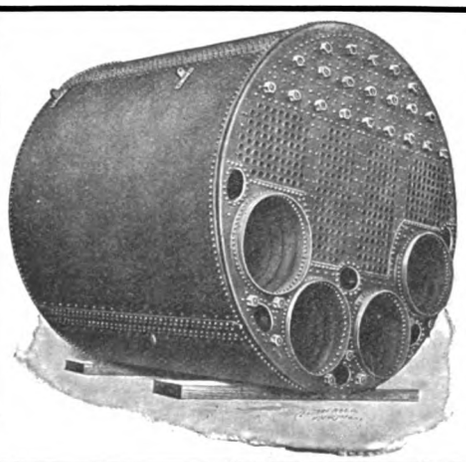
DETROIT, MICH.



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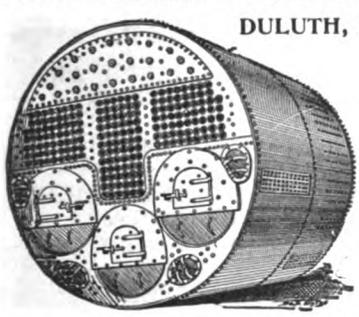

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RESIDENCE CALLS: M. A. RYAN, *Pres. and Gen'l Mgr.*, 776-R.
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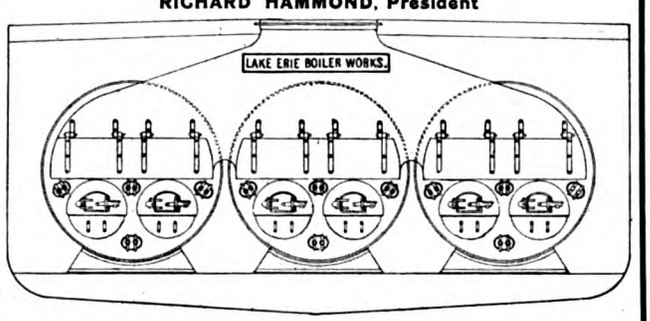
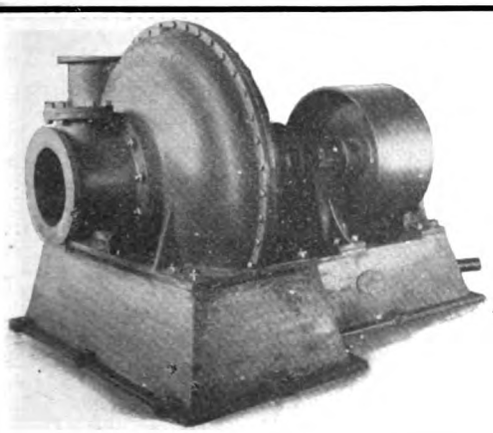
LAKE ERIE BOILER WORKS

RICHARD HAMMOND, President



THE BEST EQUIPPED PLANT IN AMERICA FOR THE MANUFACTURE OF MODERN MARINE BOILERS **BUFFALO, N. Y.**



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Dredging Machinery, Centrifugal Pumps Hoisting Engines, Marine Engines.

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For a more complete classification than that represented by advertisers in The Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, Marine and Naval Directory of the United States, published by The Marine Review, Cleveland.

[See accompanying Index of Advertisers for full addresses of concerns in this Directory.]

AIR COMPRESSION, HOISTS.
Great Lakes Engineering Works.... ....Detroit.

AIR PORTS, DEAD LIGHTS, ETC.
Marine Mfg. & Supply Co..... ..... New York.

AIR PUMPS AND APPLIANCES.
Fore River Ship & Engine Co..... ..... Quincy, Mass.
Great Lakes Engineering Works.... .... Detroit.

ANCHORS.
Bowers, L. M. & Co..... .....Binghamton, N. Y.

ANTI-FRICTION METALS.
Cramp, Wm. & Sons....Philadelphia.

ARTIFICIAL DRAFT FOR BOILERS.
American Ship Building Co..... .... Cleveland.
Detroit Ship Building Co....Detroit.
Great Lakes Engineering Works.... .... Detroit.

ASH EJECTORS.
Great Lakes Engineering Works.... .... Detroit.

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Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten..... .... Cleveland.
Hoyt, Dustin & Kelley....Cleveland.
Jenkins, Russell & Eichelberger.... ....Cleveland.
Kremer, C. E. .....Chicago.
MacDonald, Ray G.....Chicago.
Maytham, Frank.....Buffalo
Shaw, Warren, Cady & Oakes..... .... Detroit.
White, Johnson, McCaslin & Cannon ....Cleveland.

BAROMETERS, MARINE GLASSES, ETC.
Ritchie, E. S. & Sons..... .....Brookline, Mass.

BLOCKS, SHEAVES, ETC.
Boston Lockport Block Co..... ....Boston, Mass.

BLOWERS.
American Blower Co., Detroit, Mich.

BOAT BUILDERS.
Drein, Thos. & Son..... ....Wilmington, Del.
Kahnweiler's Sons, David..... ....New York.
Truscott Boat Mfg. Co..... .....St. Joseph, Mich.

BOILER COMPOUNDS.
The Bird-Archer Co.....New York
Dearborn Drug & Chemical Works.. ....Chicago.
Lake Erie Boiler Compound Co..... .....Buffalo
State Manufacturing Co...Cleveland.

BOILER MANUFACTURERS.
Almy Water Tube Boiler Co..... .....Providence, R. I.
American Ship Building Co..... .... Cleveland.
Atlantic Works..East Boston, Mass.
Briggs, Marvin.....New York.
Chicago Ship Building Co..Chicago.
Cramp, Wm. & Sons..Philadelphia.
Detroit Ship Building Co....Detroit.
Fletcher, W. A. & Co..... .....Hoboken, N. J.
Fore River Shipbuilding Co..... ....Quincy, Mass.
Great Lakes Engineering Works.... .... Detroit.
Kingston Foundry & Machine Works .....Oswego, N. Y.
Lake Erie Boiler Wks.....Buffalo
Maryland Steel Co..... .....Sparrow's Point, Md.
McLaughlin Iron Wks ..Ashtabula, O.
Milwaukee Dry Dock Co..... ....Milwaukee.
Mosher Water Tube Co..New York.
Newport News Ship Building Co.. ....Newport News, Va.
New York Shipbuilding Co..... ..... Camden, N. J.
Northwestern Steam Boiler & Mfg. Co..... ....Duluth, Minn.
Quintard Iron Works Co..... ....New York.
Roberts Safety Water Tube Boiler Co. .....New York.
Superior Ship Building Co..... ..... Superior, Wis.
Taylor Water Tube Boiler Co.... .... Detroit.
Toledo Ship Building Co.....Toledo.

BOILER RIVETS.
Bourne-Fuller Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co..... .....Cuyahoga Falls, O.

BRASS AND BRONZE CASTINGS.
Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co..... ....Quincy, Mass.
Great Lakes Engineering Works.. .... Detroit.
Lunkenheimer Co.....Cincinnati.

BRIDGES, BUILDERS OF.
Scherzer Rolling Lift Bridge Co.... ....Chicago.

BUCKETS, ORE AND COAL.
Brown Hoisting & Conveying Machine Co..... Cleveland.
G. H. Williams Co.....Cleveland.

CABIN AND CABINET FINISHING WOODS.
Martin-Barriss Co.....Cleveland.

CANVAS SPECIALTIES.
Baker & Co., H. H.....Buffalo.
Bunker, E. A.....New York.
Upson-Walton Co.....Cleveland.

CAPSTANS.
American Ship Windlass Co..... ..... Providence, R. I.
Dake Engine Co..... .....Grand Haven, Mich.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co..... ....New York.

CEMENT, IRON FOR REPAIRING LEAKS.
Smooth-On Mfg. Co..... .....Jersey City, N. J.

CHAIN SURVEYORS, HOISTS.
Brown-Hoisting Machinery Co..... ....Cleveland.
General Electric Co..... .....Schenectady, N. Y.

CHAIN HOISTS.
Boston & Lockport Block Co..... ..... Boston, Mass.

CHARTS.
Penton Publishing Co....Cleveland

CHECK VALVES.
Scoville Check Valve Co., Ashtabula, O.

CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.
Ritchie, E. S. & Sons..... ..... Brookline, Mass.

CLOTHING, WATERPROOF.
Armstrong, E. A. Mfg. Co...Chicago.

COAL PRODUCERS AND SHIPPERS.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co....Cleveland.
Pittsburg Coal Co.....Cleveland

COAL AND ORE HANDLING MACHINERY.
Brown-Hoisting Machinery Co..... ....Cleveland.

COMPASSES.
Ritchie, E. S. & Son..... .... Brookline, Mass.

CONDENSERS.
Great Lakes Engineering Works.... .... Detroit.
Wheeler Condenser & Engineering Co..... New York.

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Breymann Bros., G. H.....Toledo.
Buffalo Dredging Co.....Buffalo.
Dunbar & Sullivan Dredging Co.... ....Buffalo.
Great Lakes Dredge & Dock Co.... .... Chicago.
Hickler Bros..... ....Sault Ste. Marie, Mich.
Hubbell Co., H. W..Saginaw, Mich
Smith Co., L. P. & J. A...Cleveland.
Starke Dredge & Dock Co., C. H... .... Milwaukee.
Standard Contracting Co..Cleveland.
Sullivan, M..... Detroit

CORDAGE.
Baker & Co., H. H.....Buffalo.
Upson-Walton Co.....Cleveland

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G. H. Breymann & Bro's

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Dredging, Dock Building, Etc.

5, 6 AND 7 MARINE BUILDING
TOLEDO, OHIO.

Great Lakes Dredge & Dock Company

RIVER AND HARBOR IMPROVEMENTS

Foundations, Bridges, Piers, Breakwaters, Lighthouses, Tunnels, Pneumatic and Submarine Work.

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DULUTH CLEVELAND TOLEDO

SAULT STE. MARIE

Buffalo Dredging Co.

GENERAL CONTRACTORS
ON
SUBMARINE WORK

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Dunbar and Sullivan
DREDGING
Company
BUFFALO, N. Y.

REMOVE SUBMARINE
ROCK OR EARTH

Hickler Brothers

SAULT STE. MARIE, MICH.

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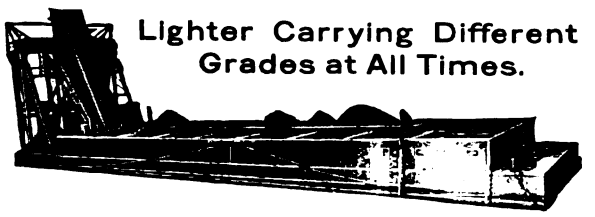
Capacity, 1,000 tons. Draft, 7½ ft. forward, 13½ ft. aft. Length on keel blocks, 180 ft.; over all, 190 ft.

Machine Shop, Foundry and Steam Forge, Dredges, Drill Boats and Derrick Scows.

Steamboat Fuel at Ashtabula
Large Supplies of Best Quality.

Lighter Carrying Different Grades at All Times.



Fuel Scow with elevators and discharging spouts. Storage of 800 tons. Discharges 250 tons an hour into steamers while unloading cargo.

M. A. Hanna & Co., Miners and Shippers.
Main Office, Perry-Payne Bldg., Cleveland.

H. W. HUBBELL CO.

Submarine Work of all kinds

Dredging Hard Material a Specialty.

SAGINAW - - MICH.

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Buyers' Directory of the Marine Trade.—*Continued.*

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Armstrong Cork Co..Pittsburg, Pa.
Kahnweiler's Sons, D....New York.

CRANES, TRAVELING.
Brown-Hoisting Machinery Co.....
.... Cleveland.

DIVING APPARATUS.
Morse, A. J. & Son.....Boston.
Schrader's Son, Inc., A..New York.

DREDGING CONTRACTORS.
Breymann & Bros., G. H....Toledo.
Buffalo Dredging Co.....Buffalo.
Dunbar & Sullivan Dredging Co....
.... Buffalo.
Great Lakes Dredge & Dock Co..
.... Chicago.
Hickler Bros. .....
.....Sault Ste. Marie, Mich.
Hubbell Co., H. W..Saginaw, Mich.
Starke Dredge & Dock Co., C. H...
....Milwaukee.
Sullivan, M.....Buffalo.

DREDGING MACHINERY.
Quintard Iron Works Co.New York.
Superior Iron Works...Superior, Wis.

DRY DOCKS.
American Ship Building Co.....
.... Cleveland.
Atlantic Works ..East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....
.... Chicago.
Cramp, Wm. & Sons..Philadelphia.
Detroit Ship Building Co.....
.... Detroit
Great Lakes Engineering Works....
.... Detroit.
Lockwood Mfg. Co.....
.....East Boston, Mass.
Milwaukee Dry Dock Co.....
....Milwaukee.
Newport News Ship Building Co...
.....Newport News, Va.
Shipowners' Dry Dock Co.Chicago.
Superior Ship Building Co.....
.... Superior, Wis.
Tietjen & Lang Dry Dock Co.....
..... Hoboken, N. J.
Toledo Ship Building Co.....Toledo.

DYNAMOS.
General Electric Co.....
....Schenectady, N. Y.

ELECTRIC HOISTS AND CRANES.
General Electric Co.....
.....Schenectady, N. Y.

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General Electric Co.....
.....Schenectady, N. Y.

ENGINE BUILDERS, MARINE.
American Blower Co., Detroit, Mich.
American Ship Building Co.....
..... Cleveland.
Atlantic Works, East Boston, Mass.
Briggs, Marvin.....New York.
Chicago Ship Building Co., Chicago.
Chase Machine Co.....Cleveland.
Cramp, Wm. & Sons, Philadelphia.
Detroit Ship Building Co., Detroit.
Fletcher, W. & A. Co., Hoboken, N. J.
Fore River Shipbuilding Co.....
..... Quincy, Mass.
Great Lakes Engineering Works....
..... Detroit, Mich.
Hall Bros. ..... Philadelphia.

ENGINE BUILDERS—Continued.
Lockwood Mfg. Co.....
.....East Boston, Mass.
Maryland Steel Co.....
.....Sparrows Point, Md.
Milwaukee Dry Dock Co., Milwaukee.
Mosher, Chas. D.....New York.
Newport News Ship Building Co....
.....Newport News, Va.
New York Ship Building Co.....
.....Camden, N. J.
Northwestern Steam Boiler & Mfg. Co. ..... Duluth, Mich.
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Superior Ship Building Co.....
..... Superior, Wis.
Thropp, J. E. & Sons Co.....
.....Trenton, N. J.
Toledo Ship Building Co.....Toledo.
Trout, H. G.....Buffalo.

ENGINE ROOM TELEGRAPH CALL BELLS, ETC.
Cory, Chas. & Son.....New York.
Marine Mfg. Supply Co., New York.

ENGINEERING SPECIALTIES AND SUPPLIES.
Lunkenheimer Co. ..... Cincinnati.
Northwestern Steam Boiler & Mfg. Co. ..... Duluth, Minn.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.
Hynd, Alexander ..... Cleveland.
Hunt, Robt. W. & Co.....Chicago.
Kidd, Joseph.....Duluth, Minn.
Mosher, Chas. D.....New York.
Nacey, James ..... Cleveland.
Roelker, H. B.....New York.
Wood, W. J.....Chicago.

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American Blower Co., Detroit, Mich.

FEED WATER PURIFIERS AND HEATERS.
Ross Valve Co.....Troy, N. Y.
Wheeler Condenser & Engineering Co. ..... New York.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.
General Electric Co.....
.....Schenectady, N. Y.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.
Cleveland City Forge & Iron Co....
..... Cleveland.
Fore River Shipbuilding Co.....
..... Quincy, Mass.

FLUE WELDING.
Fix's S. Sons.....Cleveland.

FUELING COMPANIES AND COAL DEALERS.
Hanna, M. A. & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Pickands, Mather & Co., Cleveland.
Pittsburg Coal Co.....Cleveland.
Smith, Stanley B., & Co., Detroit.
Toledo Fuel Company, ...Toledo, O.

FURNACES FOR BOILERS.
Continental Iron Works, New York.

GAS BUOYS.
Safety Car Heating & Lighting Co..
..... New York.

GAS AND GASOLINE ENGINES.
Chase Machine Co.....Cleveland.

GAUGES, STEAM AND VACUUM.
Lunkenheimer Co. ..... Cincinnati.

GAUGES, WATER.
Lunkenheimer Co.....Cincinnati, O.

GENERATING SETS.
General Electric Co.....
.....Schenectady, N. Y.

GRAPHITE.
Dixon Crucible Co., Joseph.....
.....Jersey City, N. J.

HAMMERS, STEAM.
Chase Machine Co.....Cleveland.

HEATING AND VENTILATING APPARATUS.
American Blower Co., Detroit, Mich.

HOISTS FOR CARGO, ETC.
American Ship Building Co.....
..... Cleveland.
Brown Hoisting Machinery Co.....
..... Cleveland.
Chase Machine Co.....Cleveland.
Dake Engine Co.....
.....Grand Haven, Mich.
General Electric Co.....New York.
Hyde Windlass Co.....Bath, Me.
Marine Iron Co.....Bay City.

HOLLOW STAYBOLT IRON.
Falls Hollow Staybolt Co.....
.....Cuyahoga Falls, O.

HYDRAULIC DREDGES.
Great Lakes Engineering Works....
.... Detroit.

HYDRAULIC TOOLS.
Watson-Stillman Co., The.....
..... New York.

ICE MACHINERY.
Great Lakes Engineering Works....
..... Detroit.
Roelker, H. B.....New York.

INJECTORS.
American Injector Co.....Detroit.
Jenkins Bros.....New York.
Lunkenheimer Co. ..... Cincinnati.
Penberthy Injector Co.....
..... Detroit, Mich.

INSURANCE, MARINE.
Atlantic Mutual Insurance Co.....
.....New York.
Belcher, Fred P.....Winnipeg.
Elphicke, C. W. & Co.....Chicago.
Gilchrist & Co., C. P.....Cleveland.
Hawgood & Co., W. A., Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.
McCurdy, Geo. L.....Chicago.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Peck, Chas. E. & W. F.....
.....New York and Chicago.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.
Vance & Joys Co.....Milwaukee.

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AND
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Milwaukee, - - Wisconsin.

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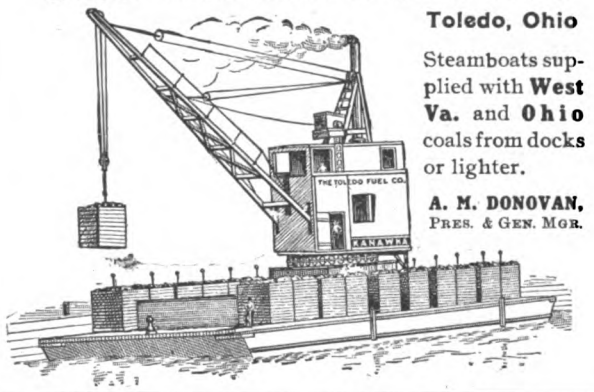

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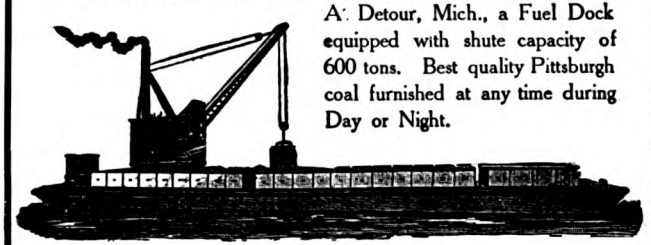

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Buyers' Directory of the Marine Trade---*Continued.*

IRON ORE AND PIG IRON.
Bourne-Fuller Co.....Cleveland, O.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co., Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.
Truscott Boat Mfg. Co.....
.....St. Joseph, Mich.

LIFE PRESERVERS, LIFE BOATS, BUOYS.
Armstrong Cork Co.....Pittsburg.
Carley Life Float Co.....
.....New York, N. Y.
Drein, Thos. & Son.....
..... Wilmington, Del.
Kahnweiler's Sons, D.....New York.

LOGS.
Nicholson Ship Log Co., Cleveland.
Walker & Sons, Thomas.....
..... Birmingham, Eng.

LUBRICATING GRAPHITE.
Dixon Crucible Co., Joseph.....
.....Jersey City, N. J.

LUBRICATORS.
Lunkenheimer Co. ..... Cincinnati.

LUMBER.
Martin-Barriss Co. ..... Cleveland.

MACHINISTS.
Chase Machine Co.....Cleveland.
Hickler Bros., Sault Ste. Marie, Mich.
Lockwood Mfg. Co.....
.....East Boston, Mass.
McLaughlin Iron Works, Ashtabula, O.
Superior Iron Works.Superior, Wis.

MACHINE TOOLS (WOOD WORKING).
Atlantic Works, Inc....Philadelphia.

MARINE RAILWAYS
Hickler Bros., Sault Ste. Marie, Mich.

MARINE RAILWAYS, BUILDERS OF,
Crandall & Son, H. I.....
.....East Boston, Mass.

MARINE TORCHES.
Marine Torch Co.....Baltimore.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W.....New York

MECHANICAL DRAFT FOR BOILERS.
American Blower Co., ...Detroit.
American Ship Building Co.....
..... Cleveland.
Detroit Ship Building Co., Detroit.
Great Lakes Engineering Works....
..... Detroit.

METALLIC PACKING.
Katzenstein, L. & Co., New York.
The National Metallic Packing Co..
.....Oberlin, O.

MOTORS, GENERATORS—ELECTRIC.
General Electric Co.....
.....Schenectady, N. Y.

NAUTICAL INSTRUMENTS.
Ritchie, E. S., & Sons.....
..... Brookline, Mass.

NAVAL ARCHITECTS.
Hynd, Alexander .....Cleveland
Kidd, Joseph .....Duluth, Minn.
Mosher, Chas. D.....New York.
Nacey, James .....Cleveland
Wood, W. J.....Chicago

OAKUM.
Stratford, Oakum Co.....
.....Jersey City, N. J.

OILS AND LUBRICANTS.
Dixon Crucible Co., Joseph.....
.....Jersey City, N. J.

PACKING.
Jenkins Bros.....New York.
Katzenstein, L. & Co...New York.
Robertson, Jos. L. & Sons.....
....New York.
The National Metallic Packing Co...
..... Oberlin, O.

PAINTS.
Baker, Howard H. & Co....Buffalo.
Upson-Walton Co.....Cleveland.

PATTERN SHOP MACHINERY.
Atlantic Works, Inc. ..Philadelphia.

PILE DRIVING AND SUBMARINE WORK.
Buffalo Dredging Co.....Buffalo.
Dunbar & Sullivan Dredging Co....
..... Buffalo.
Great Lakes Dredge & Dock Co....
..... Chicago.
Hickler Bros..Sault Ste. Marie, Mich.
Hubbell Co., H. W...Saginaw, Mich.
Parker Bros. Co., Ltd.....Detroit.
Starke Dredge & Dock Co., C. H...
....Milwaukee.
Sullivan, M.....Detroit.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland, O.

PLANING MILL MACHINERY.
Atlantic Works, Inc....Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.
Bourne-Fuller Co.....Cleveland, O.
Otis Steel Co.....Cleveland.

PRESSURE REGULATORS.
Ross Valve Co.....Troy, N. Y.

PROPELLER WHEELS.
American Ship Building Co.....
..... Cleveland.
Atlantic Works ..East Boston, Mass.
Cramp, Wm. & Sons..Philadelphia.
Detroit Ship Building Co....Detroit.
Fore River Shipbuilding Co.....
..... Quincy, Mass.
Great Lakes Engineering Works....
.... Detroit.
Hyde Windlass Co.....Bath, Me.
Lockwood Mfg. Co.....
.....East Boston, Mass.
Milwaukee Dry Dock Co.....
....Milwaukee.
Newport News Ship Building Co..
.....Newport News, Va.
Roelker, H. B.....New York.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co.....
.....Superior, Wis.
Thropp & Sons Co., J. E.....
.....Trenton, N. J.
Toledo Ship Building Co.....Toledo.
Trout, H. G.....Buffalo.

PROJECTORS, ELECTRIC.
General Electric Co.....
.....Schenectady, N. Y.

PUMPS FOR VARIOUS PURPOSES.
Great Lakes Engineering Works..
.... Detroit.
Kingsford Foundry & Machine Works .....Oswego, N. Y.
Wheeler Condenser & Engineering Co. .....New York.
Roelker, H. B.....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register.....Cleveland.

RIVETS, STEEL FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland, O.
Great Lakes Engineering Works....
.... Detroit.

SAFETY VALVES.
Lunkenheimer Co.....Cincinnati.

SAIL MAKERS.
Baker, Howard H. & Co....Buffalo.
Upson-Walton Co.....Cleveland.

SALVAGE COMPANIES.
See Wrecking Companies.

SEARCH LIGHTS.
General Electric Co.....
.....Schenectady, N. Y.

SHEARS.
See Punches, and Shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland, O.
Otis Steel Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....
.... Cleveland.
Atlantic Works ..East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Collingwood Shipbuilding Co.,.....
..... Collingwood, Ont.
Cramp, Wm. & Sons..Philadelphia.
Chicago Ship Building Co..Chicago.
Detroit Ship Building Co....Detroit.
Fore River Ship Building Co.....
....Quincy, Mass.
Great Lakes Engineering Works....
....Detroit.
Lockwood Mfg. Co.....
.....East Boston, Mass.
Maryland Steel Co.....
.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....
.... Milwaukee.
Newport News Ship Building Co...
.....Newport News, Va.
New York Shipbuilding Co.....
.....Camden, N. J.
Roach's Ship Yard.....Chester, Pa.
Shipowner's Dry Dock Co..Chicago.
Toledo Ship Building Co.....Toledo.

SHIP CHANDLERS.
Baker, Howard H. & Co....Buffalo.
Marine Mfg. & Supply Co.....
..... New York
Upson-Walton Co.....Cleveland.

SHIP DESIGNERS.
Kidd, Joseph .....Duluth.
Steel, Nacey, & Hynd....Cleveland.
Wood, W. J.....Chicago.

SHIP FLOORING.
Clemente, The C., Co....Cleveland.

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NAMES OF CHARTS

LAKE ONTARIO

Lake Ontario
St. Lawrence River Nos. 1, 2, 3 4, 5, 6
Coast-Charts Nos. 1, 2, 3, 4, 5
Oswego Harbor
Little Sodus Bay
Great Sodus Bay
Charlotte Harbor
Niagara Falls

LAKE ERIE

Lake Erie
Coast-Charts Nos. 1, 2, 3, 4, 5, 6, 7
Detroit River
Lake St. Clair
St. Clair River
Buffalo Harbor and Niagara River
Dunkirk Harbor
Erie Harbor and Presque Isle
Conneaut Harbor
Ashtabula Harbor
Fairport Harbor
Cleveland Harbor
Lorain Harbor
Huron Harbor
Sandusky Bay
Maumee Bay and Maumee River

LAKE HURON

Lake Huron and Georgian Bay
South End of Lake Huron
Saginaw Bay
Straits of Mackinac
Coast-Charts Nos. 5, 6, 7, 8
Sand Beach Harbor of Refuge
Saginaw River
Tawas Harbor
Thunder Bay
Presque Isle and Middle Island
St. Marys River Nos. 1, 2, 3
St. Joseph Channel and Western End of North Channel

LAKE MICHIGAN

Lake Michigan
North End of Lake Michigan
South End of Lake Michigan
Beaver Island Group
Grand and Little Traverse Bays
Coast-Charts Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9
South End of Green Bay
North End of Green Bay
Manistique Harbor
Charlevoix Harbor
South Fox Island Shoals
Manitou Passage
Frankfort Harbor
Manistee Harbor
Ludington Harbor
Muskegon Harbor
Harbor at Michigan City
Lake Front, Chicago
Milwaukee Harbor
Sheboygan Harbor
Manitowoc Harbor
Sturgeon Bay, Canal, and Harbor of Refuge
Head of Green Bay
Little Bay de Noc
Portage Lake, Manistee Co.

LAKE SUPERIOR

Lake Superior
Lake Superior Nos. 1, 2, 3
Coast-Charts Nos. 1, 6
Coast-Chart No. 8, including Isle Royal
Grand Island
Marquette and Presque Isle Harbors
Huron Bay and Huron Islands
L'Anse and Keweenaw Bay
Portage Lake and River
Copper Harbor
Agate Harbor
Eagle Harbor
Eagle River
Ontonagon Harbor
Apostle Islands Nos. 1, 2
Duluth and Superior Harbor
Agate and Burlington Bays (Two Harbors)

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Buyers' Directory of the Marine Trade---*Continued.*

SHIP LANTERNS AND LAMPS.
Upson-Walton Co..... Cleveland.

SHIP TIMBER.
Martin-Barriss Co.....Cleveland.

SHOES.
Emerson Shoe Co. .....Cleveland.

SIGNALS—SUBMARINE.
Submarine Signal Co.....Boston

SMOOTH-ON COMPOUND, FOR REPAIRS.
Smooth-On Mfg. Co.....
.....Jersey City, N. J.

STAYBOLT IRON OR STEEL BARS, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....
.....Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.
Holmes, Samuel .....New York.
McCarthy, T. R....Montreal, Can.

STEAMSHIP LINES, PASS, AND FREIGHT.
American Line .....New York.
Boston Steamship .....Boston.
C. & B. Transit Co.....Cleveland.
International Mercantile Marine Co.
.... Philadelphia.
Mallory Line .....New York.
New York & Cuba Mail S. S. Co..
....New York.
Red Star Line .....New York.
Ward Line .....New York.

STEAM SPECIALTIES.
Robertson, Jas. L. & Sons ..New York.

STEEL CASTINGS.
Otis Steel Co.....Cleveland.

STEERING APPARATUS.
American Ship Building Co.....
....Cleveland.
Chase Machine Co.....Cleveland.
Dake Engine Co.....
.....Grand Haven, Mich.
Detroit Ship Building Co....Detroit.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co.....
....New York.
Sheriffs Mfg. Co.....Wilwaukee.

SUBMARINE DIVING APPARATUS.
Morse & Son, A. J.....Boston.
Schrader's Son, Inc. A....New York.

SURVEYORS, MARINE.
Hynd, Alexander .....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Nacey, James .....Cleveland.

SURVEYORS, MARINE—Continued.
Steel, Adam .....Cleveland.
Wood, W. J.....Chicago.

SYPHONS.
Philip Braender....New York City.

TESTS OF MATERIALS.
Hunt, Robert W. & Co....Chicago.
Lunkenheimer Co....Cincinnati, O.

THERMIT
Goldschmidt Thermit Co.,
..... New York City.

THREAD CUTTING TOOLS.
Armstrong Manufacturing Co. .....
.....Bridgeport, Conn.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
Watson-Stillman Co.....New York.

TOOLS, WOOD WORKING.
Atlantic Works, Inc....Philadelphia.

TOWING MACHINES.
American Ship Windlass Co.....
.....Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.
Donnelly Salvage & Wrecking Co..
.....Kingston, Ont.
Great Lakes Towing Co..Cleveland.

TRUCKS.
Boston & Lockport Block Co.....
..... Boston.

TUBING, SEAMLESS.
Shelby Steel Tube Co..Pittsburg, Pa.

VALVES, STEAM SPECIALTIES, ETC.
Jenkins Bros. .....New York
Lunkenheimer Co.....Cincinnati.
Ross Valve Co.....Troy, N. Y.

VALVES FOR WATER AND GAS.
Ashton Valve Co.,.....Boston.
Lunkenheimer Co.....Cincinnati.
Ross Valve Co.....Troy, N. Y.
Scoville Check Valve Co.....
..... Ashtabula, O.

VESSEL AND FREIGHT AGENTS.
Billett, T. R.....Winnipeg.
Boland, John J.....Buffalo.
Douglas, G. L. Jr.....Duluth
Elphicke, C. W. & Co.....Chicago.
Hall, John B.....Buffalo.
Helm & Co., D. T.....Duluth.

VESSELS AND FREIGHT AGENTS—Con.
Hawgood & Co., W. A....Cleveland.
Holmes, Samuel .....New York.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago

WATER GAUGES.
Lunkenheimer Co.....Cincinnati, O.

WHISTLES, STEAM.
Lunkenheimer Co.....Cincinnati.

WILFORD'S WATERPROOF CLOTH.
Bunker, E. A..... New York.

WIRE ROPE AND WIRE ROPE FITTINGS.
Baker, H. H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.

WINDLASSES.
American Ship Windlass Co.....
..... Providence, R. I.
American Ship Building Co.....
..... .Cleveland.
Dake Engine Co.....
.....Grand Haven, Mich.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co.....
....New York.

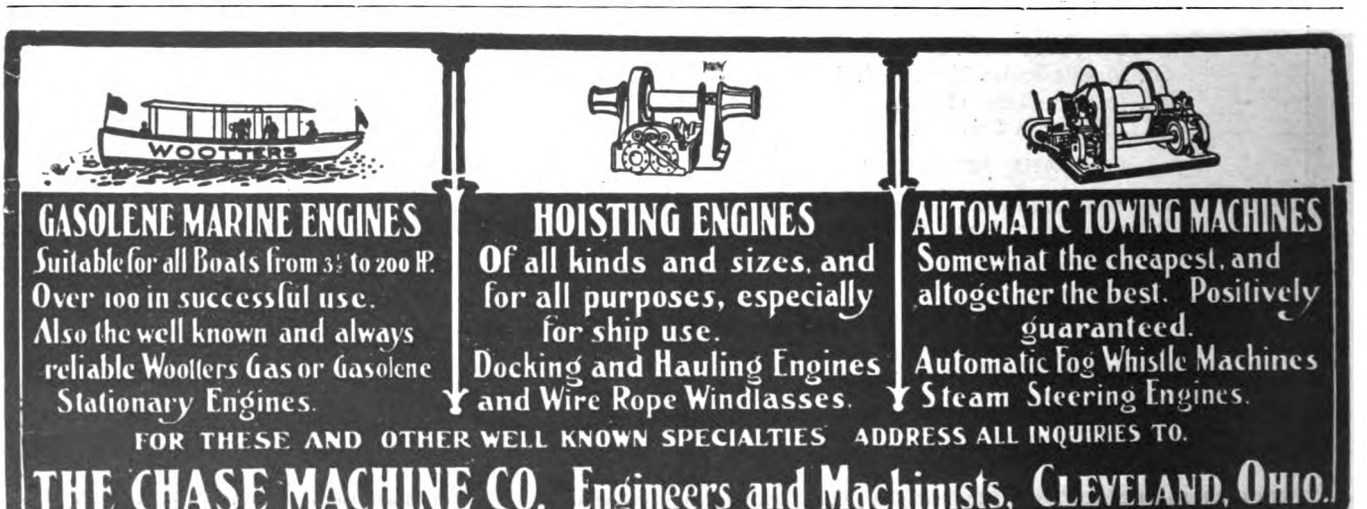
WINCHES.
American Ship Windlass Co.....
.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.
Atlantic Works, Inc....Philadelphia.

WRECKING AND SALVAGE COMPANIES.
Donnelly Salvage & Wrecking Co..
..... Kingston, Ont.
Great Lakes Towing Co..Cleveland.
Parker Bros. Co., Ltd.....Detroit.

YACHT AND BOAT BUILDERS.
Drein, Thos. & Son.....
..... Wilmington, Del.
Truscott Boat Mfg. Co.....
.....St. Joseph, Mich.

YAWLS.
Drein, Thos. & Son.....
..... .Wilmington, Del.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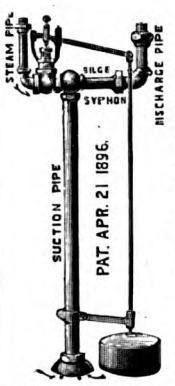

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This automatic device has received commendation from all leading engineers throughout the country. Its simplicity of construction, durability, and entire freedom from possible disarrangement, together with its pronounced success in removing large quantities of water at a nominal cost of operation, has won for it the approval of ship-owners and seamen everywhere. With all these advantages, its moderate cost places it within the reach of every one. By giving the BRAENDER BILGE SYPHON a trial you will be convinced that it does everything we claim for it.

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Easy to adjust, and can be handled by any one.

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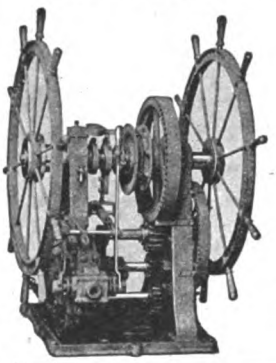

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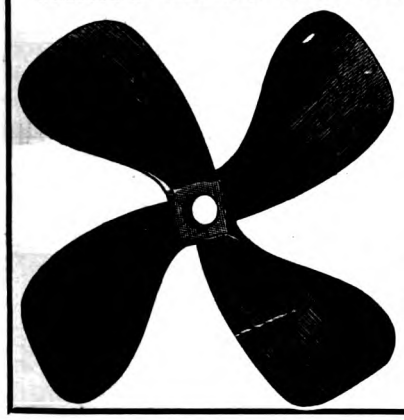

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Self-Igniting Inextinguishable

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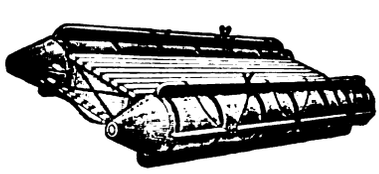

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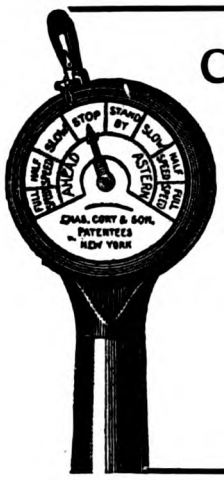

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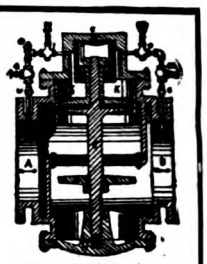

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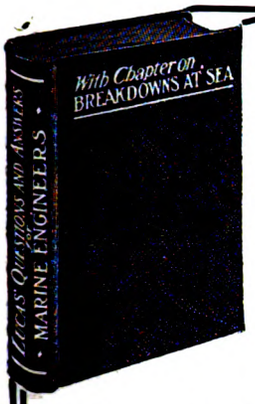

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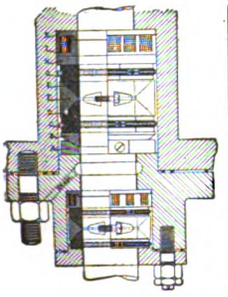

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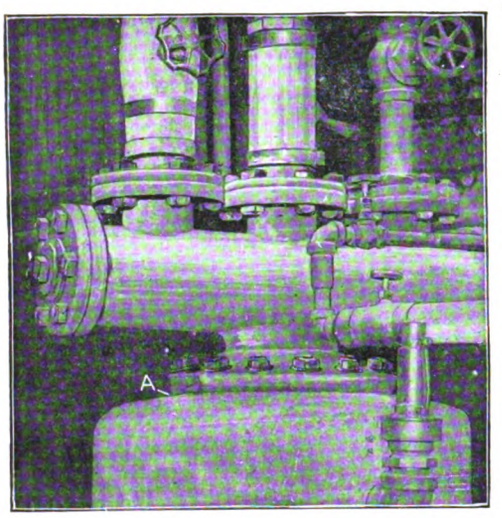

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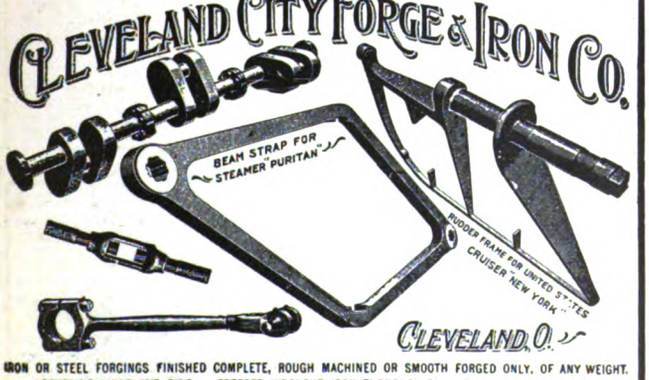

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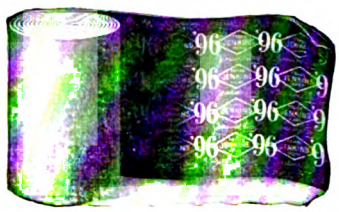

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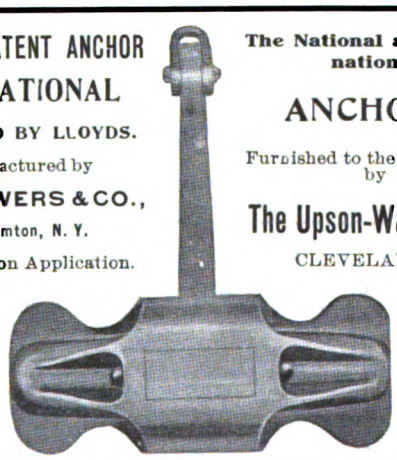

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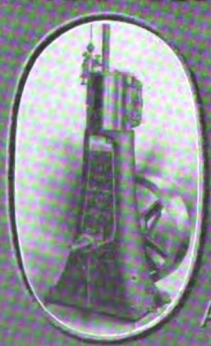

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